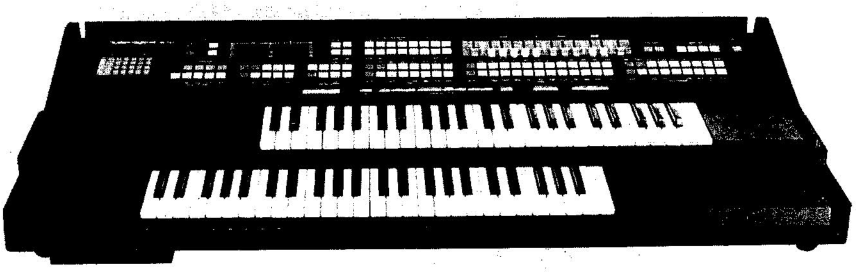
JVC

SERVICE MANUAL

SYSTEM KEYBOARD

MODEL NS-70B/N/H



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No. 6525
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Specifications

Item	Description
Sound source	Three master sound sources 1. Upper preset : Polyphonic 8 notes 2. Lower preset : Polyphonic 8 notes 3. Solo preset : Monophonic
Keyboard	Upper : 49 keys (C3 ~ C7, 4 octaves) Lower : 49 keys (C2 ~ C6, 4 octaves)
Custom combination memory	8 kinds of memories Memorizes all settings of switches and volumes except those of rhythm, computer, and composer. (with Effect memory canceller)
Solo/arpeggio presets	15 presets • Trumpet • Trombone • Pan flute • Jazz flute • Violin • Celo • Hawaiian guitar • Clarinet • Saxophone • Mouth organ • Whistle • Rock guitar • Synthe. percussion • UFO • Storm Solo to Arpeggio Solo to Lower Custom Select
Upper preset	24 presets • High strings • Low strings • Synthe. strings • Soft brass • Bright brass • Synthe. brass • Full organ • Organ • Jazz organ • Human voice • Feather voice • Accordion • Piano • Bright piano • Electric piano • Harpsichord • Guitar • Vibraphone • Feather clavier • Synthe. celesta • Luna flute • Sound track • Horror • Planet Sustain Custom select
Lower preset	13 presets • High strings • Low strings • Soft brass • Synthe. brass • Full organ • Organ • Piano • Electric piano • Guitar • Human voice • Bandneon • Feather clavier • Sound track Sustain Lower to Upper Custom select
Bass preset	7 presets • Bass 1 • Bass 2 • Electric bass • Chopper bass • Bowing bass • Tuba • Synthe. bass Sustain Bass to Lower Custom select
Rhythm accomp.	7 presets • Piano • Guitar • Feather guitar • Brass • Synthe. clavier • Synthe. walla • Metallic Custom select

Item	Description
Auto-rhythm	14 rhythms x 4 variations • Waltz • Polka/March • Samba • Latin • Bassanova • Tango • Disco • Rock'n roll • Rock 1 • Rock 2 • Reggae • Slow rock • Swing • Shaffle rock Rhythm reverb. Hand crap/Tambourine Tempo : ♩ = 40 ~ 248 Start/Stop Synchro start Intro. & Fill-in
Manual drums	High Tom-tom (HT) Middle Tom-tom (MT) Low Tom-tom)LT) Small Conga (SC) Large Conga (LC) Tambourine (TB) Hand crap (HC) Symbal (CY) Cow Bell (CB) Closed High-hat (CHH 1) Closed High-hat (CHH 2) Open High-hat(OHH) Cabasa (CA) Snare Drum (SD) Rim Shot (RS) Bass Drum (BD)
Effects	Ultra chord (Closed/Open) Grand effect (Stereo reverb./Feather speed) Stereo effect (Celesta/Symphonic) Sustain (Upper/Lower/Bass) Touch response (Upper/Lower/Solo)
Fascinating chords	One-finger/Multi-finger Chord memory Custom bass Rhythm accomp. Bass } 4 variations per rhythm Arpeggio
Compucorder & Composer	Chords record : 128 bars Variations record: 4 variations Melodies record: 544 notes x 2 parts Chord composition Arpeggio : 2 x 4 (8 patterns) Rhythm accomp. : 2 x 4 (8 patterns) Bass : 2 x 4 (8 patterns) Rhythm composition Intro. & Fill-in : 2 x 4 (8 patterns) Rhythm : 2 x 4 (8 patterns)
Sound creater	Edit/Write Value up/down, 33 parameters Memory presets: Solo (15), Upper (24) Lower (13), Bass (7) Rhythm accomp. (7)
Other controls	Power ON/OFF switch Magic Foot : Start/Stop, Upper sustain, Solo bend, Intro.& Fill-in Volume: Solo, Upper, Lower, Rhythm accomp., Bass Pitch : Solo, Upper, Other Mic. volume:] Front
External terminals	AUX OUT (R/L), System OUT AUX IN (R/L) Organ signal IN EXP. IN (R/L) EXP. pedal Foot switch MIDI IN/OUT/THRU Pedal keyboard Mic. IN Headphones] Front
Power source	AC 240/220/120 V, 50/60 Hz
Power consumption	32 W
Finish	Black colored metal case
Dimensions	122.3(W) x 21.7(H) x 49.2(D) mm
Weight	30.0 kg

INITIAL SETTINGS

When power is turned on, setting modes initially become as follow.
In this state, LEDs of the preset switches flicker moderately, however, flickering stops if any preset switch is pressed.

- Magic foot : Start/Stop
- Solo/Arpeggio : Trombone
- Upper : High strings
- Lower : Soft brass
- Rhythm accomp. : Feather guitar
- Bass : Bass 1
- Fascinating chord : Normal
- PCM stereo rhythm : Disco, Hand crap, Rhythm reverb.
- Digital composer : Melody, Orchestra (at Sequence No. 1)
- Custom combination memory : Cancel
- Stereo effect : Celeste
- Touch response : Solo, Upper, Lower

Safety Precautions

- Parts marked with ⚠ symbol in parts lists and parts screened on circuit diagrams are important ones for safety. When replacing those parts, make sure to use the specified one for safety and long service life.
- When removing or disengaging wire clamps around the power source line in servicing, make sure to place and tighten them as they were before.

Notes:

- Parts with * symbol in parts lists are newly adopted ones.
- Parts without parts numbers nor prices are not supplied as spare parts.
- Voltages shown in circuit diagrams are values measured by a digital voltmeter (internal resistance: more than 10 MΩ).

Features

- Multi-functional microcomputer system with four MPUs
- Compucorder having sequence function memorizes 128 bars
- Two kinds of melodies (544 tones each) can be composed and memorized.
- Composer performing and memorizing auto-accompaniment (arpeggio, accomp. bass, and custom rhythm)
- Stereo auto-rhythm by PCM system
- Manual drum for optionally performing percussion
- Custom combination memory for one-touch accessing of preset, effect, fascinating chord setting.
- Grade-up of the system can be made by utilizing many options such as pedal clavier, drawbar unit, etc.
- MINI IN/OUT/THRU terminals for connection with external keyboard, personal computer, and so forth.
- Magic Foot realizes four kinds of controlling by foot.
- Upper/Lower/Solo presets of three master sound sources system
- 66 kinds of presets by synthesizer circuits
- Upper/Lower presets in eight polyphonic tones
- Sound creater to generate and memorize 66 kinds of tones
- New feather and stereophonic reverberation effects
- Unique "Touch Response" automatically changes sound volume and tone in proportion to speed and strength of keying like piano performance.

Location of Main Parts

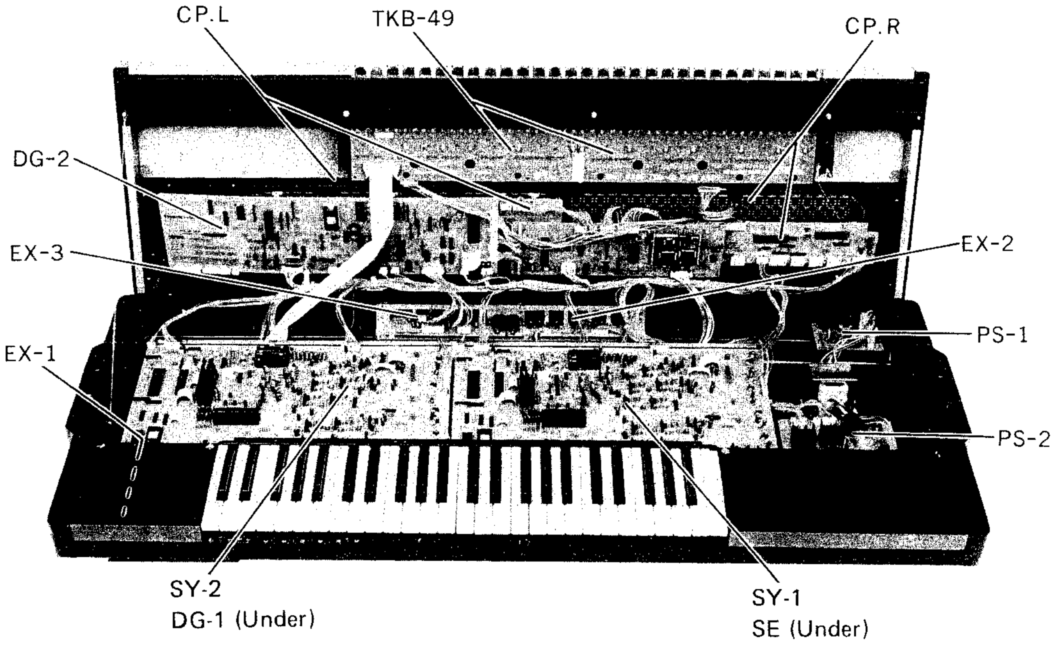


Fig. 1

Proper Servicing Items

1. Disassembly of Upper Ass'y

The upper assembly can be exposed as shown in Fig. 1 by removing nine screws A (see Fig. 2).
When exposing the inside of the assembly, pay attention to the smoked cover (music stand) not to drop out.

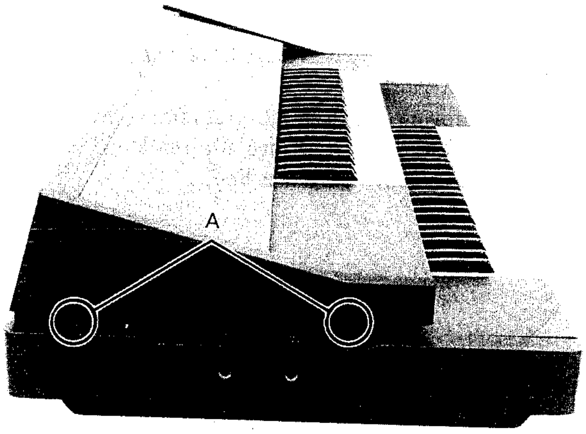


Fig. 2

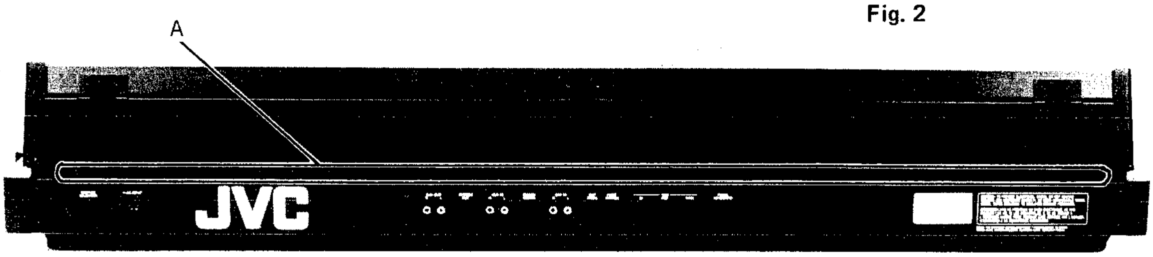


Fig. 3

2. Removal of SY P.C. Board

For inspecting DG-1 P.C. board and SE P.C. board, remove four screws B and raise the SY P.C. board upward.

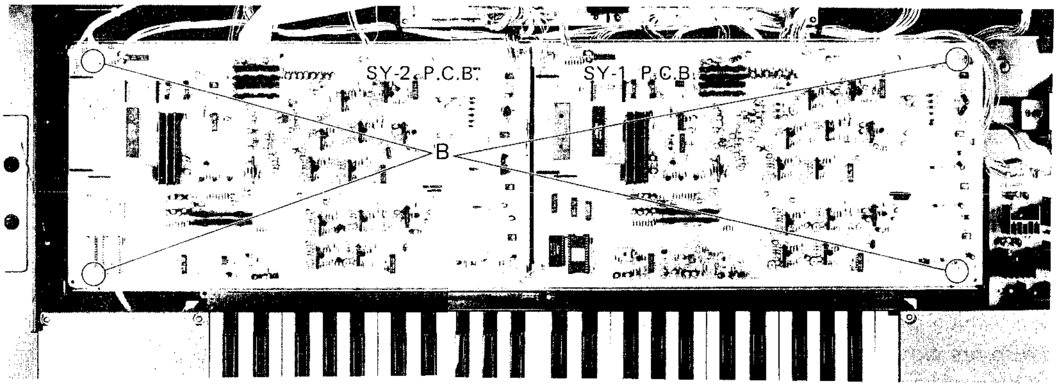


Fig. 4

3. Removal of Manual Keys

1) For removal of upper manual keys, remove the side panels first, and then remove nine screws securing the key chassis.
2) For removal of lower manual keys, remove the side panels which are fixed by two screws respectively, and then pull the side panels in the direction of the arrow mark shown in Fig. 5.

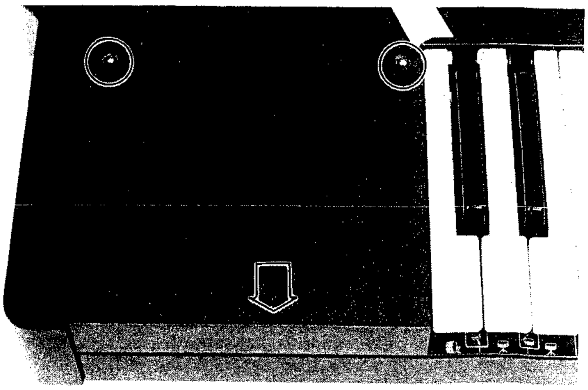


Fig. 5

3) Removal of Keys

Holding the point C depressed, pull a key in the direction of D shown in Fig. 6.

In case of removing a black key, first remove two white keys next to it and then remove the black key in the same manner as removing a white key.

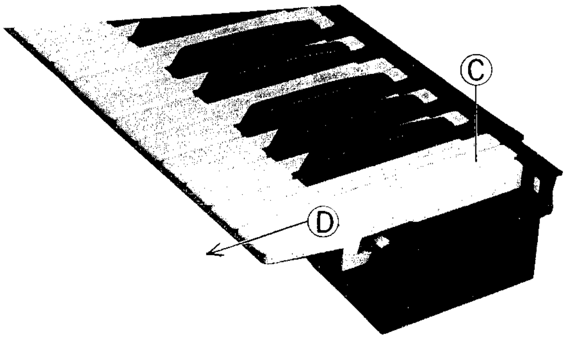


Fig. 6

4) Fitting of Keys

Taking care about setting a coil spring on the projection of the key chassis, press the point E and insert the key into a square hole F .

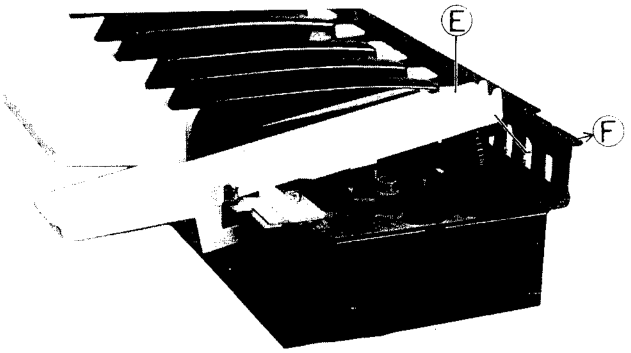


Fig. 7

4. Maintenance of Cabinet

1) Cleaning of usual stains and dust

For cleaning usual stains and dust, remove them off the cabinet by lightly wiping with such the soft cloth as woollen cloth. For removing bad stains, wipe them with cloth soaked in soapsuds (or, solvent which IPA anti-charging solvent, isopropyl-alcohol and water are equally blended) or polishing cloth. Wipe all water remaining on the surface with dry cloth.

Strongly rubbing may erase the printed letters on the panel.

Do not use volatile liquid such as gasoline, benzine, thinner, etc. which may damage and whiten the finish.

2) Flaw and scratch

Against slight scratch, grind the scratched part applying liquid puffing compound (No. 372).

5. Tone Parameters List

Parameter No.	Parameter Name	Value		Remarks	
		Min.	Max.		
11	DCO 1 OCTAVE	1	3	1 = 16′, 2 = 8′, 3 = 4′	Two DCOs exist on one channel of PFD.
12	DCO 1 SQUARE WAVE ⊓⊔	0	1	0 = OFF, 1 = ON	
13	DCO 1 SAW WAVE ⟋⟋	0	1	0 = OFF, 1 = ON	
14	DCO 2 OCTAVE	1	3	1 = 16′, 2 = 8′, 3 = 4′	
15	DCO 2 SQUARE WAVE ⊓⊔	0	1	0 = OFF, 1 = ON	
16	DCO 2 DETUNE	0	4	0 = OFF ← · · → MAX. = 4	
17	DCO 2 INTERVAL	0	12	0 = SAME ← · · → 1 OCTAVE = 12	1 = chromatic semitone 2 = whole note
18	DCO PULSE WIDTH	0	7	0 = ⊓⊔ ← · · → ⊓⊔	
21	DCO VIBRATO DEPTH	0	15	0 = OFF ← · · → MAX. = 15	Solo & Upper
22	NOISE VCF MODE	1	2	1 = VCF IN, 2 = VCF OUT	Solo only
23	NOISE LEVEL	0	31	0 = OFF ← · · → MAX. = 31	
24	VCA EG ATTACK TIME	0	31	0 = OFF ← · · → SLOW, MAX. = 31	
25	VCA EG 1ST DECAY TIME	0	31	0 = FAST ← · · → SLOW, MAX. = 31	
26	VCA EG BREAK POINT LEVEL	0	31	0 = LOW ← · · → HIGH, MAX. = 31	Between 1st & 2nd
27	VCA EG 2ND DECAY TIME	0	31	0 = FAST ← · · → SLOW, MAX. = 30	31 = Sustain
28	VCA EG RELEASE TIME	0	31	0 = FAST ← · · → SLOW, MAX. = 31	
31	VCA EG SPECIAL PERCUSSIVE	0	1	0 = OFF, 1 = ON	Short keying of higher key for 2nd Decay & Release
32	VCF CUT OFF	0	99	0 = LOW ← · · → HIGH, MAX. = 99	
33	VCF RESONANCE	0	15	0 = LOW ← · · → HIGH, MAX. = 15	
34	VCF KEYBOARD TRACKING	0	3	0 = OFF, 1 = QUARTER, 2 = HALF, 3 = FULL	Key correction
35	VCF POLARITY	1	2	1 = NORMAL, 2 = INVERT	VCF envelope polarity
36	VCF EG LEVEL	0	31	0 = OFF ← · · → MAX. = 31	
37	VCF EG ATTACK TIME	0	31	0 = FAST ← · · → SLOW, MAX. = 31	
38	VCF EG DECAY TIME	0	31	0 = FAST ← · · → SLOW, MAX. = 31	
41	VCF EG SUSTAIN LEVEL	0	31	0 = SLOW ← · · → HIGH, MAX. = 31	
42	VCF EG RELEASE TIME	0	31	0 = FAST ← · · → SLOW, MAX. = 31	
43	VCF EG MODULATE LEVEL	0	15	0 = OFF ← · · → MAX. = 15	
44	VOICE LEVEL	0	31	0 = MIN. ← · · → MAX. = 31	
45	EFFECTOR	0	7	0 = OFF 1 ~ 4 = See the table on righthand. 5 = ENSEMBLE 6 = ENSEMBLE with filter used 7 = PHASER	Stereo, Reverb. 1 Small, Small 2 Big, Mid 3 Big, Big 4 Small, Small
46	LFO FREQUENCY	1	16	1 = SLOW ← · · → FAST, MAX. = 16	
47	LFO DELAY	0	7	0 = SHORT ← · · → LONG, MAX. = 7	
48	TOUCH VCA INTENSITY	0	3	0 = OFF ← · · → MAX. = 3	Solo, Upper, Lower
51	TOUCH VCF INTENSITY	0	2	0 = OFF ← · · → MAX. = 2	

- **Other Parameters**

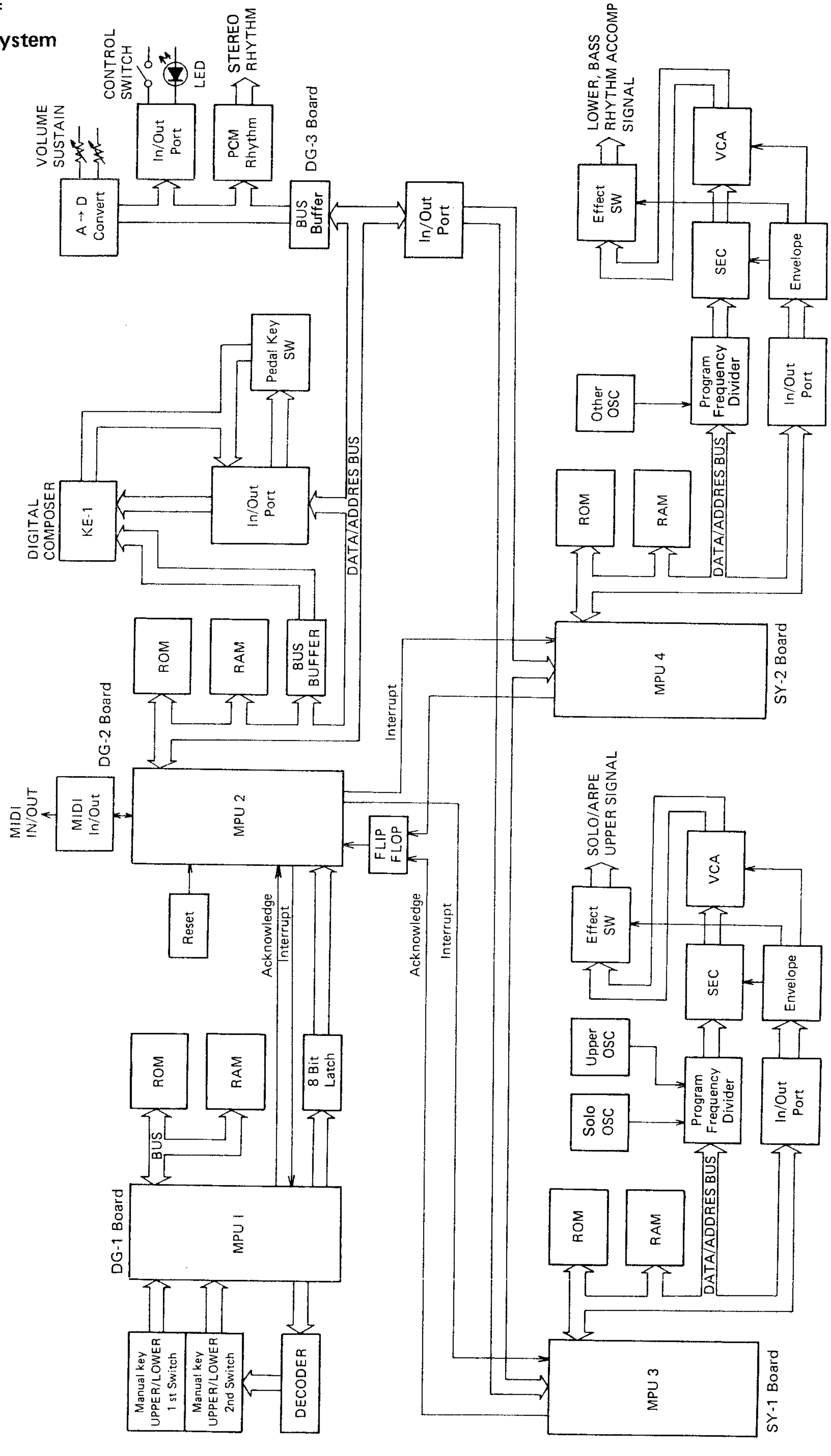
75	For adjustment of VCA balance (SY board)
76	For adjustment of VCA level (SY board)
81	Internal Custom Voice Recall
82	For designation of Upper MIDI input channel
83	For designation of Lower MIDI input channel
84	For designation of Base MIDI input channel

Notes:

- DCO is an abbreviation of Digital Control Oscillator. There are two DCOs of "1" and "2" in PFD (Programmable Frequency Divider) which generates sound source waveform by mixing the two DCO waveforms.
- EG is an abbreviation of Envelope Generator, and envelope is shaped by the D-A converter and the sample & hold circuit.

Outline of Microcomputers

1. Block Diagram of Microcomputer System


VOLUME
SUSTAIN
CONTROL SWITCH
LED
STEREO RHYTHM
A → D Convert
In/Out Port
PCM Rhythm
DG-3 Board
BUS Buffer
In/Out Port
LOWER, BASS RHYTHM ACCOMP SIGNAL
Effect SW
VCA
SEC
Envelope
Other OSC
Program Frequency Divider
In/Out Port
DATA/ADDRES BUS
ROM
RAM
MPU 4
SY-2 Board
Pedal Key SW
DIGITAL COMPOSER
KE-1
In/Out Port
DATA/ADDRES BUS
ROM
RAM
BUS BUFFER
DG-2 Board
MIDI IN/OUT
MIDI In/Out
MPU 2
Interrupt
FLIP FLOP
Reset
Acknowledge
Interrupt
Acknowledge
Interrupt
SOLO/ARPE UPPER SIGNAL
Effect SW
VCA
SEC
Envelope
Upper OSC
Solo OSC
Program Frequency Divider
In/Out Port
DATA/ADDRES BUS
ROM
RAM
8 Bit Latch
BUS
DG-1 Board
MPU I
ROM
RAM
MPU 3
SY-1 Board
Manual key UPPER/LOWER 1 st Switch
Manual key UPPER/LOWER 2nd Switch
DECODER

2. Outline of Microcomputers

There his model is equipped with four microcomputers (MPU - HD63B03XP) to realize much more functions than those of conventional keyboards. The four MPU (Micro Processing Unit) independently work according to separate programs (the same program for MPU-3 and -4), and they are connected to act in reciprocal relation.

MPU-1 in DG-1 board is used to fetch information of ON-OFF switching of the keyboards. The upper and lower key switches of this model have two contact points respectively, and the time lag set between the 1st and 2nd contacts of each key detects strength of keying (hitting speed of a key). If a key is pressed fast, generated sound is strong, while slowly pressed, sound becomes weak.

MPU-2 in DG-2 board is the central micro-processing unit in the system. This fetches informations of ON-OFF switching of a digital composer and optional pedal clavier, controlling and switching on the control panel besides inputting and outputting of MIDI signals and to/from a digital composer. RAM inside the digital composer is backed up by a lithium battery to keep memorized information of creative composition and custom combination for two years. In addition to the above functions, MPU-2 outputs informations for PCM rhythm, LED illumination, musical scale and tones. MPU-2 has two RAMs inside it to memorize tones of the sound creater, and stored informations are kept by an electrostatic condenser for about two weeks.

MPU-3 in SY-1 board generates musical scale and tone of solo/arpeggio and upper presets. Solo and arpeggio are generated in monophonic sound by the same circuit used for the both, but the upper preset polyphonically sounds in eight tones. The program frequency divider (PFD) is a circuit to generate sound source waveforms of square and saw-tooth waves by musical intervals to be outputted. SEC (Sound Effect Control) is a kind of tone filters (VCF). Keying is operated in VCA, and the effect switch classifies and divides generated sound signals to various effect circuits. Those circuits are all controlled by control signals (envelope waveform and so forth) coming from the MPU to generate various tones. The envelope waveforms are generated by the D-A converter and sample & hold circuit.

MPU-4 in SY-2 board functions as same as MPU-3, however, MPU-4 generates musical scale and tones of bass and lower presets. Bass is outputted in monophonic sound, while the lower polyphonically sounds in eight tones. When fascinating chord is used, the lower's sound becomes four polyphonic tones and other four tones are used for rhythm accompaniment.

Standard of MIDI

1. MIDI Standard of JVC Keyboard

Model	Message		Transmission	Reception
KB-60 KB-65	Channel 1		Note ON/OFF (Right of Split)	Note ON/OFF (Right of Split)
	System Message		Rhythm Start/Stop	Rhythm Start/Stop
			Timing Clock (Tempo)	Timing Clock (Tempo)
NS-5	Channel 1		Note ON/OFF (Upper)	Note ON/OFF (Upper)
		Control change	Sustain ON/OFF (Upper)	Sustain ON/OFF (Upper)
			Bend ON/OFF (Upper/Solo)	Bend ON/OFF (Upper/Solo)
			Fill-in ON/OFF (Rhythm)	Fill-in ON/OFF (Rhythm)
	Channel 2		Note ON/OFF (Lower)	Note ON/OFF (Lower)
		Control change	Sustain ON/OFF (Lower)	Sustain ON/OFF (Lower)
	Channel 14		–	Note ON/OFF (Arpeggio)
	Channel 15		Note ON/OFF (Bass)	Note ON/OFF (Bass)
	Channel 16		–	Note ON/OFF (Rhythm Accomp.)
	System Message		Rhythm Start/Stop	Rhythm Start/Stop
			Timing Clock (Tempo)	Timing Clock (Tempo)
NS-7	Channel 1		Note ON/OFF (Upper)	Note ON/OFF (Upper)
		Control change	Sustain ON/OFF (Upper)	Sustain ON/OFF (Upper)
			Bend ON/OFF (Upper/Solo)	Bend ON/OFF (Upper/Solo)
			Fill-in ON/OFF (Rhythm)	Fill-in ON/OFF (Rhythm)
		Velocity	Key touch (Upper)	Key touch (Upper)
		System Ex.	Organ Drawbar	Organ Drawbar
	Channel 2		Note ON/OFF (Lower)	Note ON/OFF (Lower)
		Control change	Sustain ON/OFF (Lower)	Sustain ON/OFF (Lower)
		Velocity	Key touch (Lower)	Key touch (Lower)
	Channel 14		–	Note ON/OFF (Arpeggio)
		Velocity	–	Key touch (Arpeggio)
	Channel 15		Note ON/OFF (Bass)	Note ON/OFF (Bass)
		Control change	Sustain ON/OFF (Bass)	Sustain ON/OFF (Bass)
		Velocity	Key touch (Bass)	Key touch (Bass)
	Channel 16		–	Manual Drums
	System Message		Rhythm Start/Stop	Rhythm Start/Stop
			Timing Clock (Tempo)	Timing Clock (Tempo)

Note: In the model NS-7, reception of Upper/Lower Bass can be optionally set for one of channel 1 throuch channel 16.

2. Definition of MIDI

MIDI is the abbreviation of "Musical Instrument Digital Interface" and the "MIDI Standard" provides standardized parts and performance of input/output terminals and information for connecting two or more electronic musical instruments and for connecting electronic musical instruments and microcomputers notwithstanding the made and brands.

The main current of recent electronic musical instruments such as electronic organs and synthesizers is to adopt digital signalling system controlled by microcomputers or the like for the purpose of doing complicated and advanced performance by controlling such the electronic musical instruments with digital signals outputted from personal computers and sequencers (automatic performing unit).

As MIDI is, of course, the world standard, any equipment having MIDI terminals can be directly connected with other products having MIDI terminals as well notwithstanding the made; and if an additional keyboard (or more keyboards) is connected with this, it will be a grade-up system.

Adjustment

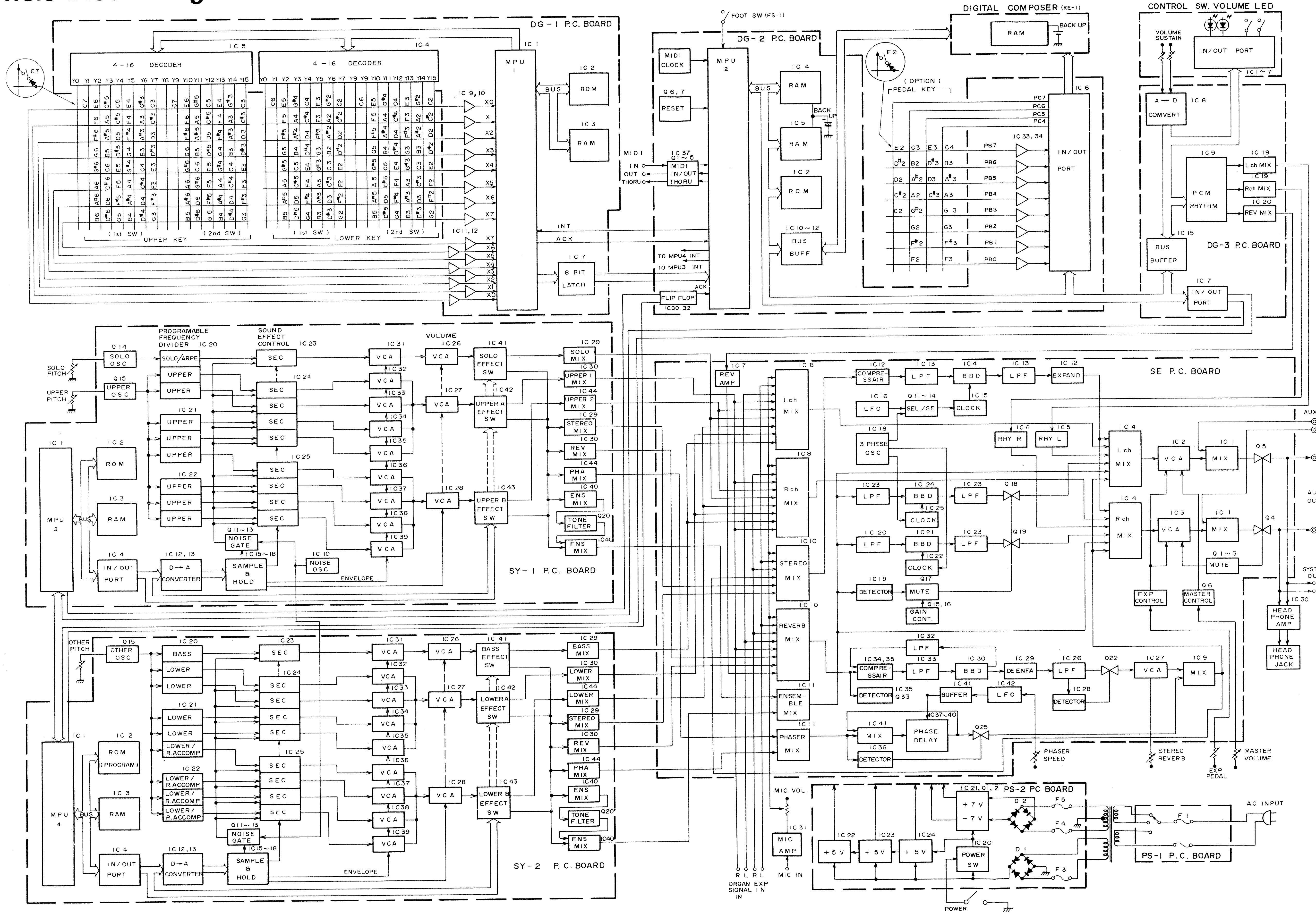
No.	Item	Measuring device	Adjusting point	Measuring point	Conditions	Adjusting Method
1	+7 V voltage	DC voltmeter	PS-2 board R42	PS-2 board R41 (● marked)	AC 100 V voltage supplied	Adjust R42 to obtain +7 V voltage.
2	BBD bias	Oscilloscope	SE board R215	SE board R210 (● marked)	Upper preset's High Strings: ON A4 key: ON	Adjust VRs to obtain waveform at the center of A (max. clipping level) and B (min. clipping level) as shown in the figure below. A (Max.) Center (Adjusting point) B (Min.)
			R225	R220 (● marked)		
			R150	R147 (● marked)		
			R278	R269 (● marked)		
3	Noise gate	By ears	SE board R302		Feather volume: Center Reverb. volume: MAX. Connect an external amp. and speakers to check noise generated.	Turn semi-fixed resistors counterclockwise starting at their center positions, and stop turning when noise increases remarkably.
			R173			
			R246			
4	Reverb. time	Oscilloscope	SE board R287	R243 (● marked)	Sustain: OFF	Adjust reverb. time for 3.5 sec.
5	VCA balance	By ears	SY-1 board		Edit: ON Parameter No. 75: IN	Turn on and off the lower A-4 key alternately to check key click noise and adjust VRs so that noise becomes minimum.
	Solo		R210		Value No. 1 (SOLO ch)	
	Upper		R220		Value No. 2 (UPPER ch)	
			R230		Value No. 3 (UPPER ch)	
			R240		Value No. 4 (UPPER ch)	
			R250		Value No. 5 (UPPER ch)	
			R260		Value No. 6 (UPPER ch)	
			R270		Value No. 7 (UPPER ch)	
			R280		Value No. 8 (UPPER ch)	
			R290		Value No. 9 (UPPER ch)	
6	VCA balance	By ears	SY-2 board		Edit: ON Parameter No. 75: IN	Turn on and off the lower A-4 key alternately to check key click noise and adjust VRs so that noise becomes minimum.
	Bass		R210		Value No.10 (BASS ch)	
	Lower		R220		Value No.11 (POWER ch)	
			R230		Value No.12 (POWER ch)	
			R240		Value No.13 (POWER ch)	
			R250		Value No.14 (POWER ch)	
			R260		Value No.15 (POWER ch)	
			R270		Value No.16 (POWER ch)	
			R280		Value No.17 (POWER ch)	
			R290		Value No.18 (POWER ch)	
7	VCA level	AC valve voltmeter	SY-1 board	SY-1 board	Edit: ON Parameter No. 76: IN Lower A-4 key: ON	Adjust VRs so that voltage measured at each measuring point becomes the following level respectively.
	Solo		R219	TP.S(R144)	Value No. 1 (SOLO ch)	−4 dB
	Upper		R229	TP.A(R145)	Value No. 2 (UPPER ch)	−10 dB
			R239		Value No. 3 (UPPER ch)	
			R249		Value No. 4 (UPPER ch)	
			R259		Value No. 5 (UPPER ch)	
			R269	TP.B(R146)	Value No. 6 (UPPER ch)	
			R279		Value No. 7 (UPPER ch)	
			R289		Value No. 8 (UPPER ch)	
			R299		Value No. 9 (UPPER ch)	

No.	Item		Measuring device	Adjusting point	Measuring point	Conditions	Adjusting Method
8	VCA level		AC valve voltmeter	SY-2 board	SY-2 board	Edit: ON Parameter No.76: IN Lower A-4 key: ON	Same procedures as the item No. 7 above.
		Bass		R219	TP.S(R144)	Value No.10 (BASS ch)	−2 dB
		Lower		R229	TP.A(R145)	Value No.11 (LOWER ch)	−10 dB
				R239		Value No.12 (LOWER ch)	
				R249		Value No.13 (LOWER ch)	
				R259		Value No.14 (LOWER ch)	
				R269	TP.B(R146)	Value No.15 (LOWER ch)	
				R279		Value No.16 (LOWER ch)	
				R289		Value No.17 (LOWER ch)	
				R299		Value No.18 (LOWER ch)	
9	Output level		AC valve voltmeter	SE board R33(R-ch)	SE board R11 (● marked)	Upper preset: Full organ By use of the sound creater, set the effecter (No.45) to "0". Master volume: MAX. Exp. pedal: MAX. C4, E4, G4 keys: ON	Adjust R33 (R-ch) and R40 (L-ch) so that output level becomes 8 dB respectively.
				R40(L-ch)	R16 (● marked)		
10	Pitch		Frequency counter	SY-1 board L1 (SOLO) L2 (UPPER)	AUX OUT	Solo preset: Violin Upper preset: Organ Lower preset: Organ By use of the sound creater, set the detune (No.16), effecter (No. 45) and vibrato (No.21) to "0" respectively. Pitch volumes of Solo, Upper and Other are set to center positions.	Solo Upper A-5 key: ON (884 Hz) Upper Upper A-6 key: ON (884 Hz)
				SY-2 board L2 (Other)			Other Lower A-5 key: ON (442 Hz)

Note:
- In items 5 and 6, the parameter No. 75 is set for box-type envelope without any signal of sound source.
- In items 7 and 8, the parameter No. 76 is set for box-type envelope with square-wave signal of sound source.

NS-70B/N/H

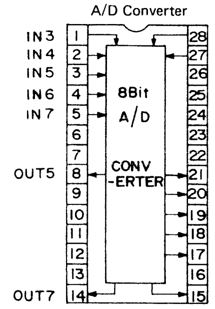
Whole Block Diagrams


DG-1 P.C. BOARD
IC 5
4-16 DECODER
IC 4
4-16 DECODER
IC 1
MPU 1
IC 2
ROM
IC 3
RAM
BUS
IC 9, 10
IC 11, 12
IC 7
8 BIT LATCH
INT
ACK
C7
(1st SW)
(2nd SW)
UPPER KEY
LOWER KEY
FOOT SW (FS-1)
DG-2 P.C. BOARD
MIDI CLOCK
MPU 2
Q6, 7
RESET
MIDI IN OUT THORU
IC 37
Q1~5
MIDI IN/OUT THORU
IC 4
RAM
IC 5
RAM
BACK UP
IC 2
ROM
IC 10~12
BUS BUFF
TO MPU4 INT
TO MPU3 INT
FLIP FLOP
IC30, 32
DIGITAL COMPOSER (KE-1)
RAM
BACK UP
E2
(OPTION)
PEDAL KEY
IC 6
IN/OUT PORT
IC 33, 34
PC7
PC6
PC5
PC4
PB7
PB6
PB5
PB4
PB3
PB2
PB1
PB0
CONTROL SW. VOLUME LED
VOLUME SUSTAIN
IN/OUT PORT
IC1~7
A→D COMVERT
IC 8
IC 9
PCM RHYTHM
IC 19
Lch MIX
Rch MIX
IC 20
REV MIX
IC 15
BUS BUFFER
DG-3 P.C. BOARD
IC 7
IN/OUT PORT
SOLO PITCH
UPPER PITCH
Q14
SOLO OSC
Q15
UPPER OSC
PROGRAMABLE FREQUENCY DIVIDER IC 20
SOLO/ARPE
UPPER
IC 21
IC 22
SOUND EFFECT CONTROL IC 23
SEC
IC 24
IC 25
VOLUME
IC 26
IC 27
IC 28
IC 31
IC 32
IC 33
IC 34
IC 35
IC 36
IC 37
IC 38
IC 39
VCA
IC 41
SOLO EFFECT SW
IC 42
UPPER A EFFECT SW
IC 43
UPPER B EFFECT SW
IC 29
SOLO MIX
IC 30
UPPER 1 MIX
IC 44
UPPER 2 MIX
STEREO MIX
REV MIX
PHA MIX
IC 40
ENS MIX
TONE FILTER
Q20
Q11~13
NOISE GATE
IC15~18
IC 10
NOISE OSC
IC 1
MPU 3
IC 2
ROM
IC 3
RAM
IC 4
IN/OUT PORT
IC 12, 13
D→A CONVERTER
SAMPLE & HOLD
ENVELOPE
SY-1 P.C. BOARD
OTHER PITCH
Q15
OTHER OSC
BASS
LOWER
LOWER / R.ACCOMP
BASS EFFECT SW
LOWER A EFFECT SW
LOWER B EFFECT SW
BASS MIX
LOWER MIX
MPU 4
ROM (PROGRAM)
SY-2 P.C. BOARD
SE P.C. BOARD
IC 7
REV AMP
IC 8
Lch MIX
Rch MIX
IC 10
STEREO MIX
REVERB MIX
IC 11
ENSEM-BLE MIX
PHASER MIX
IC 12
COMPRE-SSAIR
IC 13
LPF
BBD
EXPAND
IC 16
LFO
Q11~14
SEL./SE
IC 15
CLOCK
IC 18
3 PHESE OSC
IC 6
RHY R
IC 5
RHY L
IC 23
IC 24
IC 25
Q18
IC 20
IC 21
IC 22
Q19
IC 19
DETECTOR
Q17
MUTE
Q15, 16
GAIN CONT.
IC 32
IC 34, 35
IC 33
IC 30
IC 29
DEENFA
IC 26
Q22
IC 27
IC 9
MIX
IC 35
Q33
BUFFER
IC 42
IC 28
IC37~40
PHASE DELAY
Q25
IC 41
IC 36
PHASER SPEED
STEREO REVERB
EXP PEDAL
MASTER VOLUME
AUX IN
L
R
IC 4
L ch MIX
R ch MIX
IC 2
IC 3
IC 1
Q5
Q4
AUX OUT
Q1~3
SYSTEM OUT
Q6
EXP CONTROL
MASTER CONTROL
IC 30
HEAD PHONE AMP
HEAD PHONE JACK
MIC VOL.
IC 31
MIC AMP
MIC IN
R L R L
ORGAN EXP SIGNAL IN
IN
IC 21, Q1, 2 PS-2 PC BOARD
+7V
-7V
D2
F5
F4
IC 22
IC 23
IC 24
+5V
IC 20
POWER SW
D1
F3
POWER
AC INPUT
F1
PS-1 P.C. BOARD

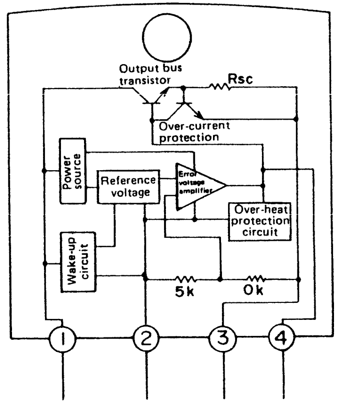
13

IC Block Diagrams

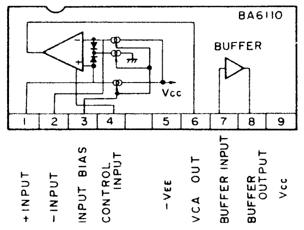
ADC0809CCN
A/D Converter


IN3
IN4
IN5
IN6
IN7
OUT5
OUT7
8Bit A/D
CONV -ERTER
IN2
IN1
IN0
OUT1
OUT2
OUT3
OUT4
OUT6
OUT8

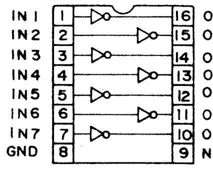
AN7805R
Regulator


Output bus transistor
Rsc
Over-current protection
Power source
Reference voltage
Error voltage amplifier
Over-heat protection circuit
Wake-up circuit
5k
0k
1
2
3
4

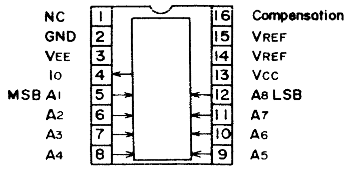
BA6110
OP. AMP


BA6110
BUFFER
Vcc
+INPUT
-INPUT
INPUT BIAS
CONTROL INPUT
-VEE
VCA OUT
BUFFER INPUT
BUFFER OUTPUT
Vcc

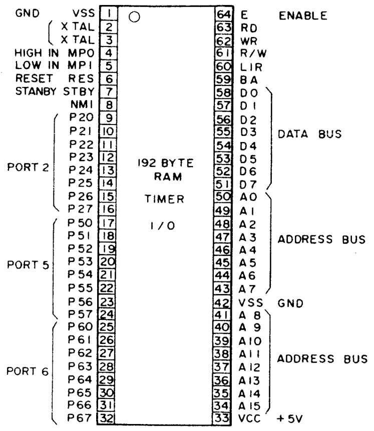
BA 6251
INVERTER


IN1
IN2
IN3
IN4
IN5
IN6
IN7
GND
OUT1
OUT2
OUT3
OUT4
OUT5
OUT6
OUT7
NC

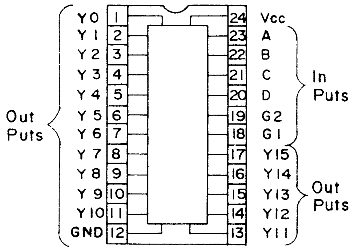
HA17408P
D/A Converter


NC
GND
VEE
Io
MSB A1
A2
A3
A4
Compensation
VREF
VREF
Vcc
A8 LSB
A7
A6
A5

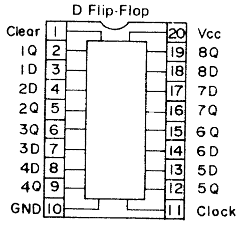
HD63B03XP
MPU


GND
XTAL
XTAL
HIGH IN MPO
LOW IN MP1
RESET
STANBY STBY
NMI
PORT 2
PORT 5
PORT 6
192 BYTE RAM
TIMER
I/O
ENABLE
DATA BUS
ADDRESS BUS
GND
ADDRESS BUS
+5V

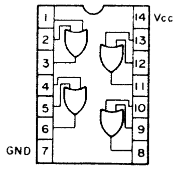
HD74HC154P
4-16 Decoder


Out Puts
In Puts
Out Puts
Vcc
GND

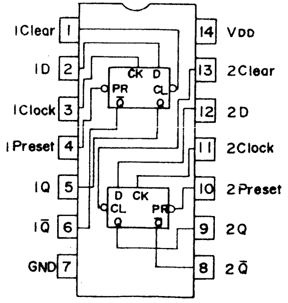
HD74HC273P
D Flip-Flop


Clear
GND
Vcc
Clock

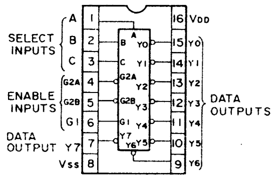
LR74HC32
DN74LS32
OR GATE



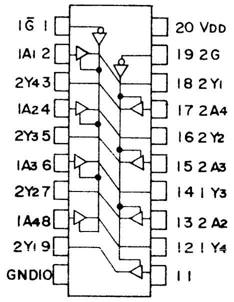
LR74HC74
D Flip-Flop


1Clear
1D
1Clock
1Preset
1Q
1Q̄
GND
VDD
2Clear
2D
2Clock
2Preset
2Q
2Q̄

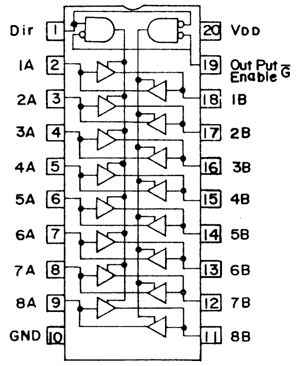
LR74HC138
3-8 DECODER


SELECT INPUTS
ENABLE INPUTS
DATA OUTPUT Y7
Vss
VDD
DATA OUTPUTS

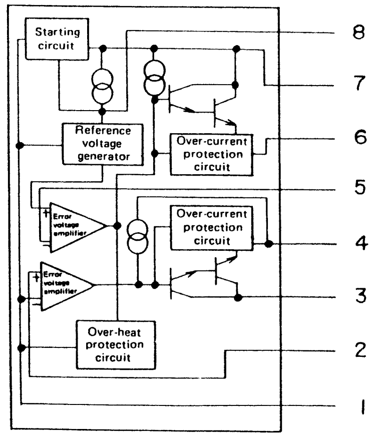
LR74HC244
BUS BUFFER


1Ḡ
1A1
2Y4
1A2
2Y3
1A3
2Y2
1A4
2Y1
GND
VDD
2Ḡ
2Y1
2A4
1Y2
2A3
1Y3
2A2
1Y4

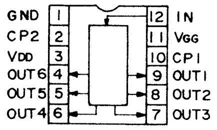
LR74HC245
BUS BUFFER


Dir
1A
2A
3A
4A
5A
6A
7A
8A
GND
VDD
Out Put Enable Ḡ
1B
2B
3B
4B
5B
6B
7B
8B

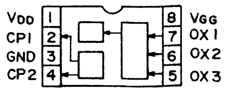
M5230L
Regulator


Starting circuit
Reference voltage generator
Over-current protection circuit
Error voltage amplifier
Over-current protection circuit
Error voltage amplifier
Over-heat protection circuit
8
7
6
5
4
3
2
1

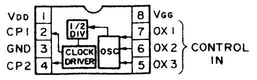
MN3011
BBD


GND
CP2
VDD
OUT6
OUT5
OUT4
IN
VGG
CP1
OUT1
OUT2
OUT3

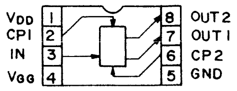
MN3101
BBD clock OSC


VDD
CP1
GND
CP2
VGG
OX1
OX2
OX3

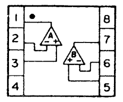
MN3102
BBD CLOCK OSC


VDD
CP1
GND
CP2
1/2 DIV
CLOCK DRIVER
OSC
VGG
OX1
OX2
OX3
CONTROL IN

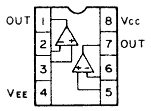
MN3204
512 step BBD


VDD
CP1
IN
VGG
OUT2
OUT1
CP2
GND

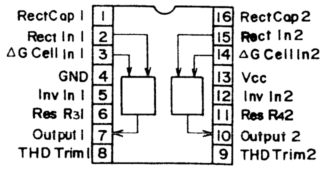
NJM4556D
OP. AMP



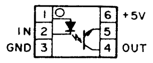
NJM082D
NJM4558DD
OP. AMP


OUT
VEE
Vcc
OUT

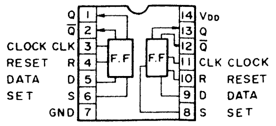
NE571N
COMPANDOR


RectCap1
Rect In1
ΔG Cell In1
GND
Inv In1
Res R3
Output1
THD Trim1
RectCap2
Rect In2
ΔG Cell In2
Vcc
Inv In2
Res R2
Output 2
THD Trim2

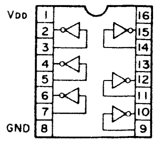
PC900
PHOTOCOUPLER


IN
GND
+5V
OUT

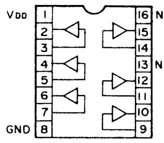
TC4013BP
D FLIP FLOP


CLOCK CLK
RESET R
DATA D
SET S
GND
VDD
CLK CLOCK
R RESET
D DATA
S SET

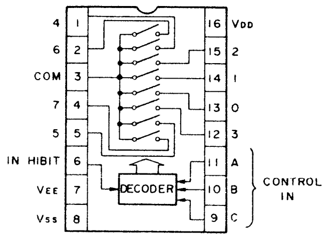
TC4049BP
INVERTING BUFFER


VDD
GND
NC
NC

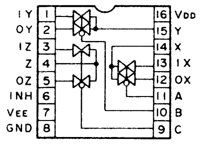
TC4050BP
BUFFER


VDD
GND
NC
NC

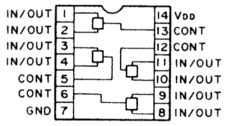
TC4051BP
8 CH SWITCH


COM
IN HIBIT
VEE
Vss
VDD
DECODER
A
B
C
CONTROL IN

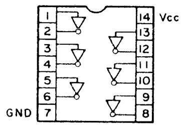
TC4053BP
2 CH SWITCH


1Y
0Y
1Z
Z
0Z
INH
VEE
GND
VDD
Y
X
1X
0X
A
B
C

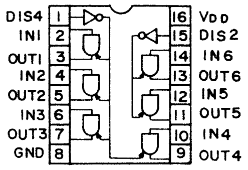
TC4066BP
QUAD BILATERAL


IN/OUT
IN/OUT
IN/OUT
IN/OUT
CONT
CONT
GND
VDD
CONT
CONT
IN/OUT
IN/OUT
IN/OUT
IN/OUT

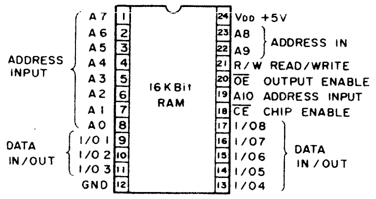
TC4069UBP
INVERTER



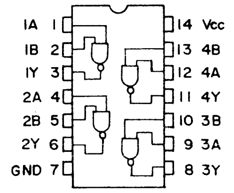
TC5012BP
BUFFER


DIS4
IN1
OUT1
IN2
OUT2
IN3
OUT3
GND
VDD
DIS2
IN6
OUT6
IN5
OUT5
IN4
OUT4

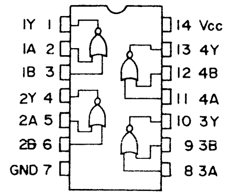
TC5517APL
RAM


ADDRESS INPUT
DATA IN/OUT
16KBit RAM
VDD +5V
ADDRESS IN
R/W READ/WRITE
OE OUTPUT ENABLE
A10 ADDRESS INPUT
CE CHIP ENABLE
DATA IN/OUT

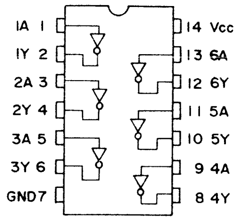
TC74HC00P
NAND Gate


1A
1B
1Y
2A
2B
2Y
GND
Vcc
4B
4A
4Y
3B
3A
3Y

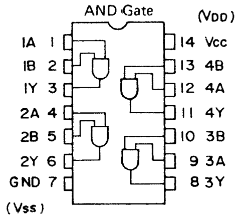
TC74HC02P
NOR Gate


1Y
1A
1B
2Y
2A
2B
GND
Vcc
4Y
4B
4A
3Y
3B
3A

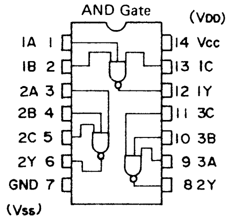
TC74HC04P
INVERTER


1A
1Y
2A
2Y
3A
3Y
GND
Vcc
6A
6Y
5A
5Y
4A
4Y

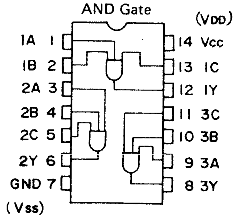
TC74HC08P
AND Gate


(VDD)
1A
1B
1Y
2A
2B
2Y
GND
(Vss)
Vcc
4B
4A
4Y
3B
3A
3Y

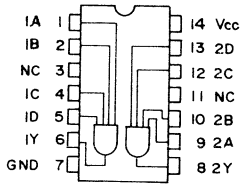
TC74HC10P
AND Gate


(VDD)
1A
1B
2A
2B
2C
2Y
GND
(Vss)
Vcc
1C
1Y
3C
3B
3A
3Y

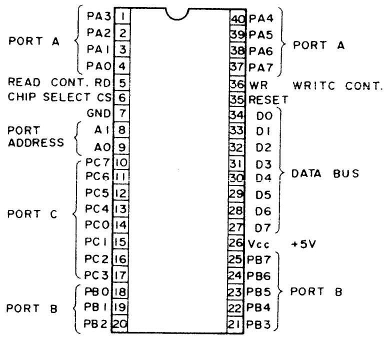
TC74HC11P
AND Gate


(VDD)
1A
1B
2A
2B
2C
2Y
GND
(Vss)
Vcc
1C
1Y
3C
3B
3A
3Y

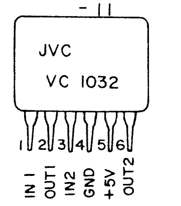
TC74HC21P
AND Gate


1A
1B
NC
1C
1D
1Y
GND
Vcc
2D
2C
NC
2B
2A
2Y

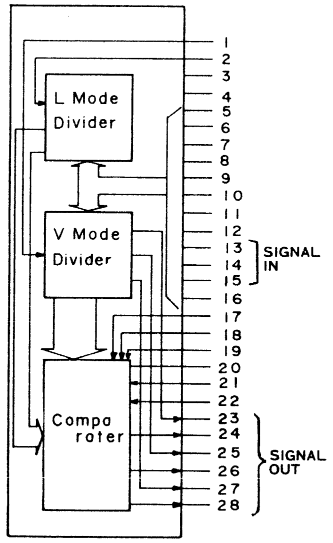
UPD8255AC-2
IN/OUT PORT


PORT A
READ CONT. RD
CHIP SELECT CS
GND
PORT ADDRESS
PORT C
PORT B
PORT A
WR WRITE CONT.
RESET
DATA BUS
Vcc +5V
PORT B

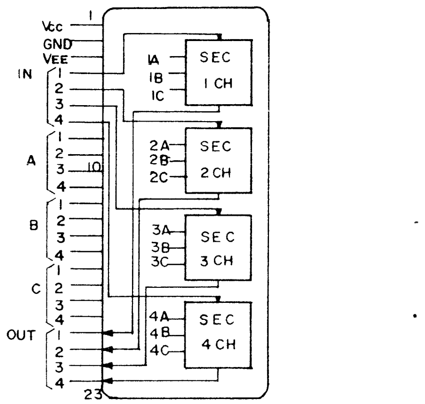
VC1032-09 FILTER
-04
-11


JVC
VC 1032
IN1
OUT1
IN2
GND
+5V
OUT2

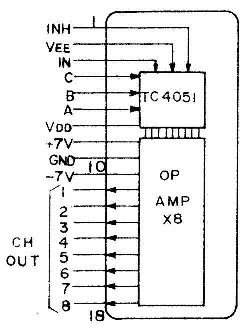
VC1040
PFD


L Mode Divider
V Mode Divider
Compa rater
SIGNAL IN
SIGNAL OUT

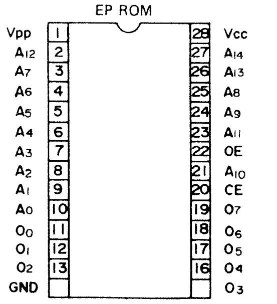
VC 1041
4CH SEC


Vcc
GND
VEE
IN
A
B
C
OUT
SEC 1CH
SEC 2CH
SEC 3CH
SEC 4CH
23

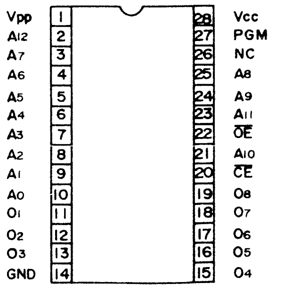
VC1042
MULTIPLE LEVEL HOLDER


INH
VEE
IN
C
B
A
VDD
+7V
GND
-7V
CH OUT
TC4051
OP AMP X8
18

HN 27256G-25
EP ROM

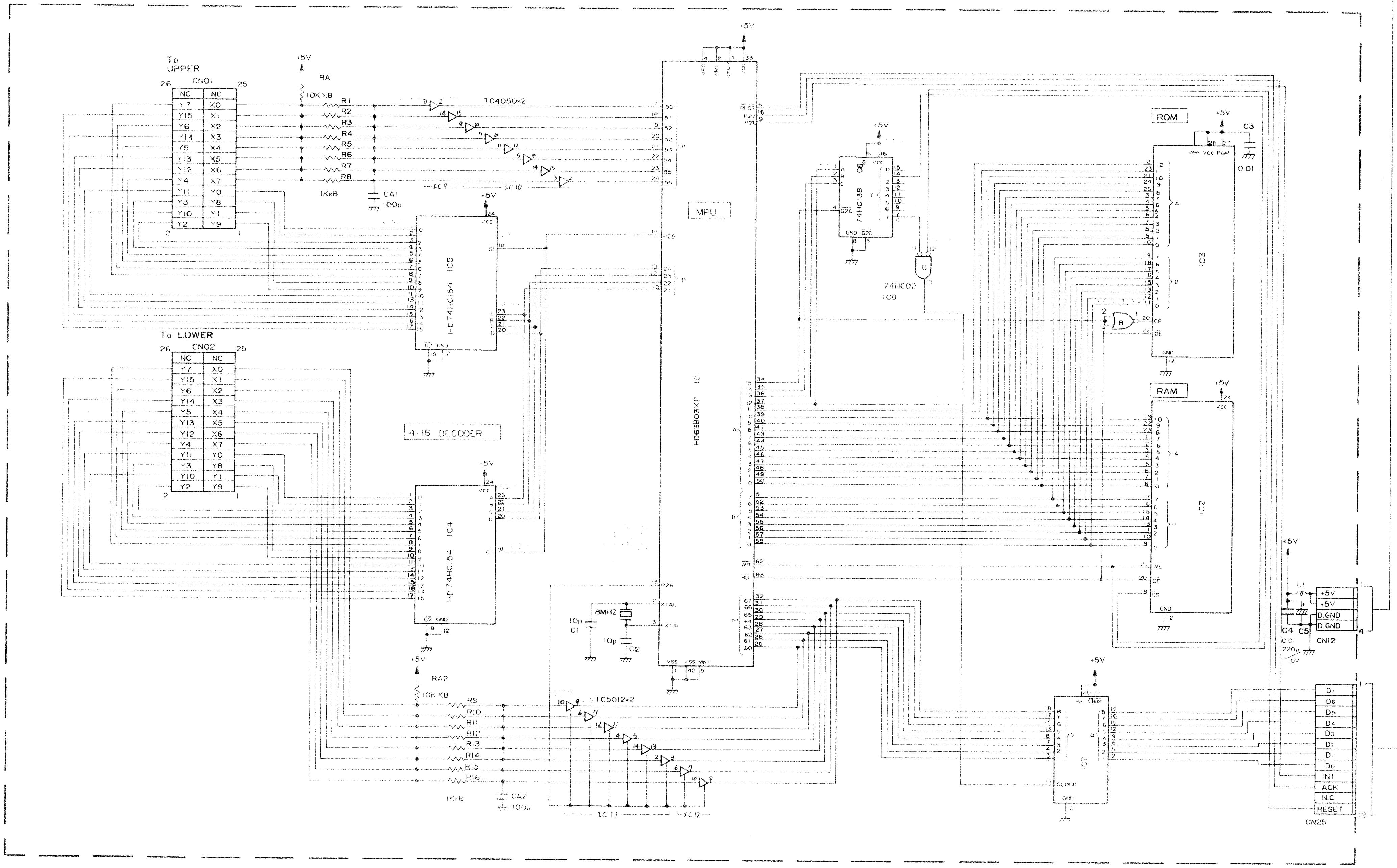

Vpp
A12
A7
A6
A5
A4
A3
A2
A1
A0
O0
O1
O2
GND
Vcc
A14
A13
A8
A9
A11
OE
A10
CE
O7
O6
O5
O4
O3

MBM2764-25Z
EP ROM


Vpp
A12
A7
A6
A5
A4
A3
A2
A1
A0
O1
O2
O3
GND
Vcc
PGM
NC
A8
A9
A11
OE
A10
CE
O8
O7
O6
O5
O4

Circuit Patterns & Schematic Diagrams

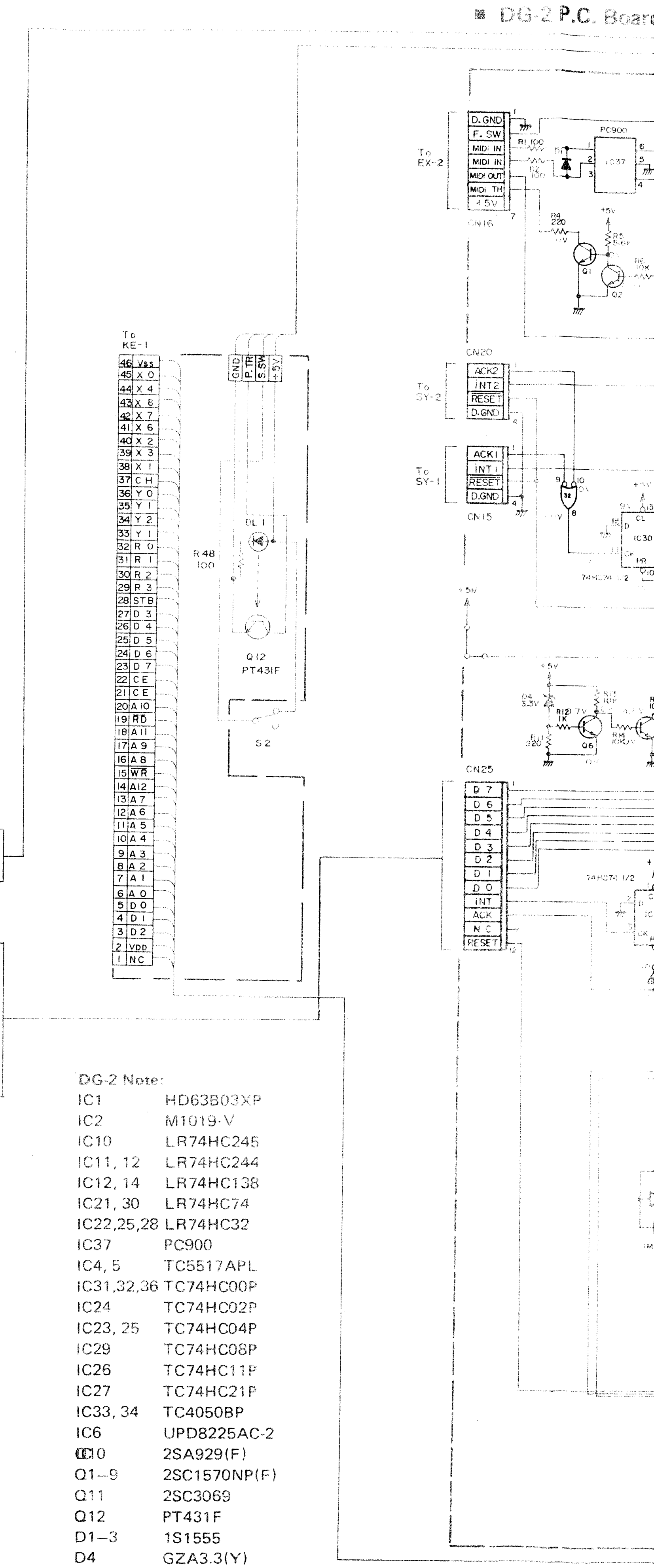
■ DG-1 P.C. Board


To UPPER
CN01
To LOWER
CN02
RA1
10K×8
1K×8
CA1
100p
TC4050×2
IC9
IC10
IC5
HD74HC154
IC4
HD74HC154
4-16 DECODER
MPU
IC1
HD63B03XP
8MHZ
C1
10p
C2
10p
ROM
IC3
C3
0.01
74HC138
IC6
74HC02
IC8
RAM
IC2
RA2
10K×8
TC5012×2
IC11
IC12
CA2
100p
IC7
L1
C4
0.01
C5
220μ
16V
CN12
CN25
+5V
GND
D.GND
INT
ACK
N.C
RESET

Note:

IC1	HD63B03XP
IC4, 5	HD74HC154P
IC7	HD74HC273P
IC6	LR74HC138
IC2	M1017V
IC9, 10	TC4050BP
IC11, 12	TC5012BP
IC2	TC5517APL
IC8	TC74HC02P

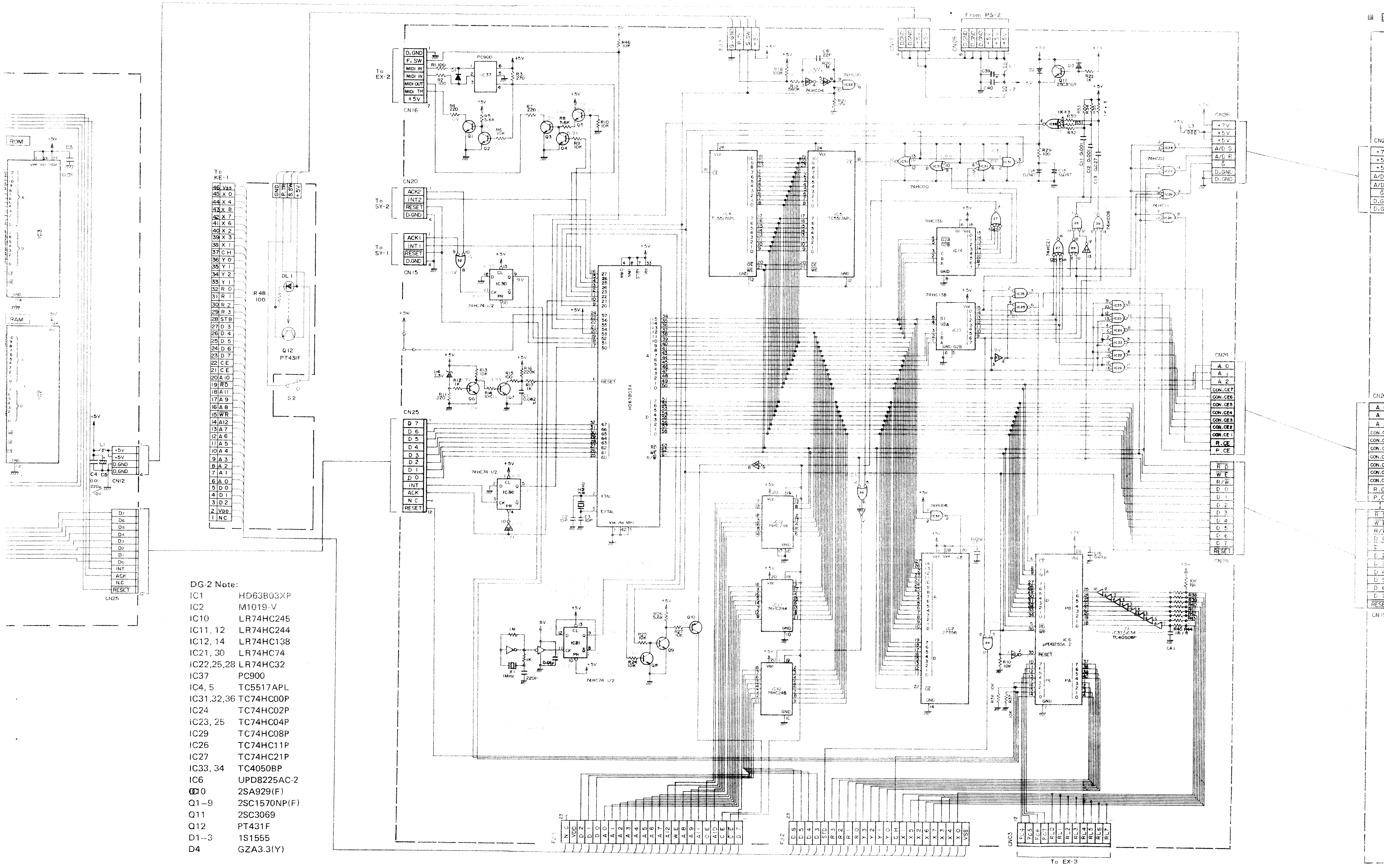
■ DG-2 P.C. Boar


To KE-1
To EX-2
CN16
PC900
IC37
Q1
Q2
CN20
To SY-2
To SY-1
CN15
R48
100
DL1
Q12
PT431F
S2
CN25
D.GND
F.SW
MIDI IN
MIDI OUT
MIDI TH
+5V
ACK2
INT2
RESET
ACK1
INT1
GND
P.TR
S.SW

DG-2 Note:

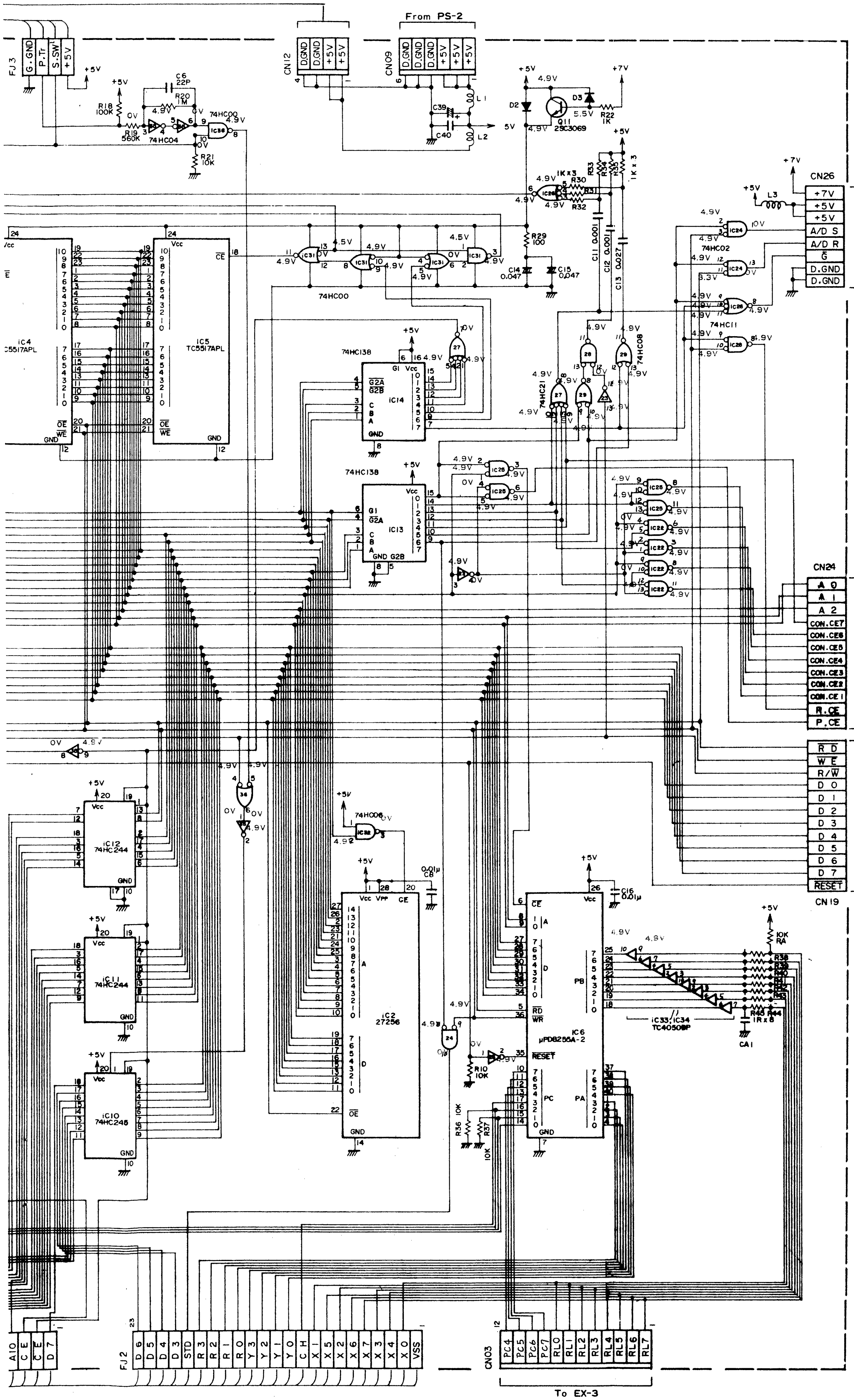
IC1	HD63B03XP
IC2	M1019-V
IC10	LR74HC245
IC11, 12	LR74HC244
IC12, 14	LR74HC138
IC21, 30	LR74HC74
IC22,25,28	LR74HC32
IC37	PC900
IC4, 5	TC5517APL
IC31,32,36	TC74HC00P
IC24	TC74HC02P
IC23, 25	TC74HC04P
IC29	TC74HC08P
IC26	TC74HC11P
IC27	TC74HC21P
IC33, 34	TC4050BP
IC6	UPD8225AC-2
Q10	2SA929(F)
Q1–9	2SC1570NP(F)
Q11	2SC3069
Q12	PT431F
D1–3	1S1555
D4	GZA3.3(Y)

■ DG-2 P.C. Board

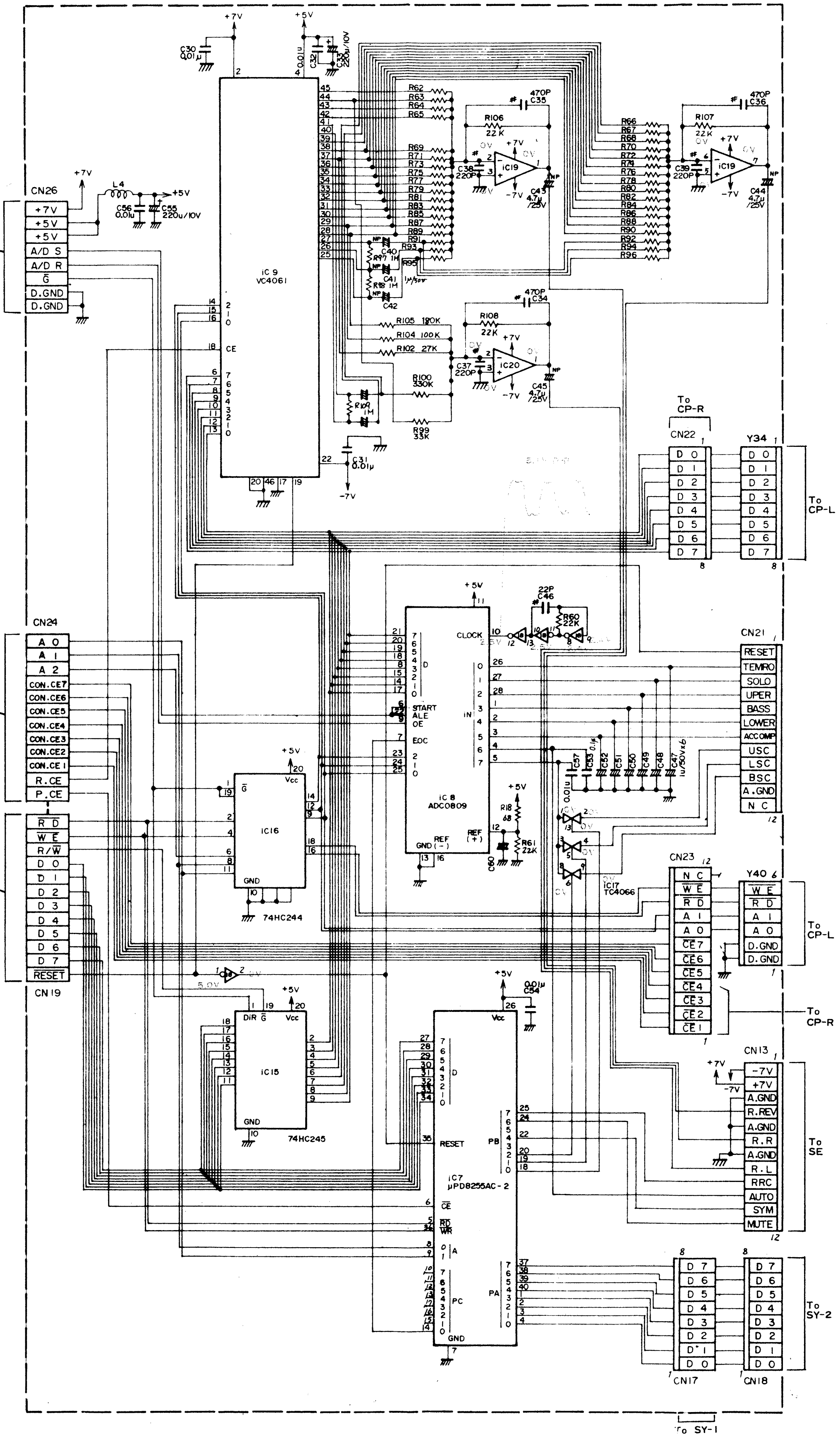

To EX-2
CN16
D.GND
F.SW
MIDI IN
MIDI OUT
MIDI TH
+5V
PC900
IC37
To KE-1
To SY-2
CN20
ACK2
INT2
RESET
D.GND
To SY-1
CN15
ACK1
INT1
74HC74 1/2
IC30
IC21
HD63B03X
IC1
CN25
D7
D6
D5
D4
D3
D2
D1
D0
INT
ACK
N.C
RESET
Q12
PT431F
DL1
R48 100
S2
ROM
IC3
RAM
IC2
CN12
CN26
CN24
CN19
From PS-2
CN09
CN13
IC4
TC5517APL
IC5
TC5517APL
74HC00
IC14
74HC138
IC13
74HC08
74HC02
74HC11
74HC21
IC12
74HC244
IC11
74HC244
IC10
74HC245
IC7
27256
IC6
μPD8255A-2
IC33, IC34
TC4050BP
Q11
2SC3069
FJ1
FJ2
CN03
To EX-3

DG-2 Note:

IC1	HD63B03XP
IC2	M1019-V
IC10	LR74HC245
IC11, 12	LR74HC244
IC12, 14	LR74HC138
IC21, 30	LR74HC74
IC22,25,28	LR74HC32
IC37	PC900
IC4, 5	TC5517APL
IC31,32,36	TC74HC00P
IC24	TC74HC02P
IC23, 25	TC74HC04P
IC29	TC74HC08P
IC26	TC74HC11P
IC27	TC74HC21P
IC33, 34	TC4050BP
IC6	UPD8225AC-2
Q10	2SA929(F)
Q1–9	2SC1570NP(F)
Q11	2SC3069
Q12	PT431F
D1–3	1S1555
D4	GZA3.3(Y)


From PS-2
FJ3
CN12
CN09
CN26
CN24
CN19
CN03
FJ2
To EX-3
IC4 TC5517APL
IC5 TC5517APL
IC14 74HC138
IC13 74HC138
IC12 74HC244
IC11 74HC244
IC10 74HC245
IC2 27256
IC6 μPD8255A-2
IC33, IC34 TC4050BP
Q11 2SC3069
74HC00
74HC02
74HC11
74HC08
74HC21
74HC04
A 0
A 1
A 2
CON.CE7
CON.CE6
CON.CE5
CON.CE4
CON.CE3
CON.CE2
CON.CE1
R.CE
P.CE
RD
WE
R/W
D0
D1
D2
D3
D4
D5
D6
D7
RESET
+7V
+5V
A/D S
A/D R
D.GND
PC4
PC5
PC6
PC7
RL0
RL1
RL2
RL3
RL4
RL5
RL6
RL7
STD
Y2
Y1
Y0
CH
X1
X5
X6
X7
X3
X4
X0
VSS

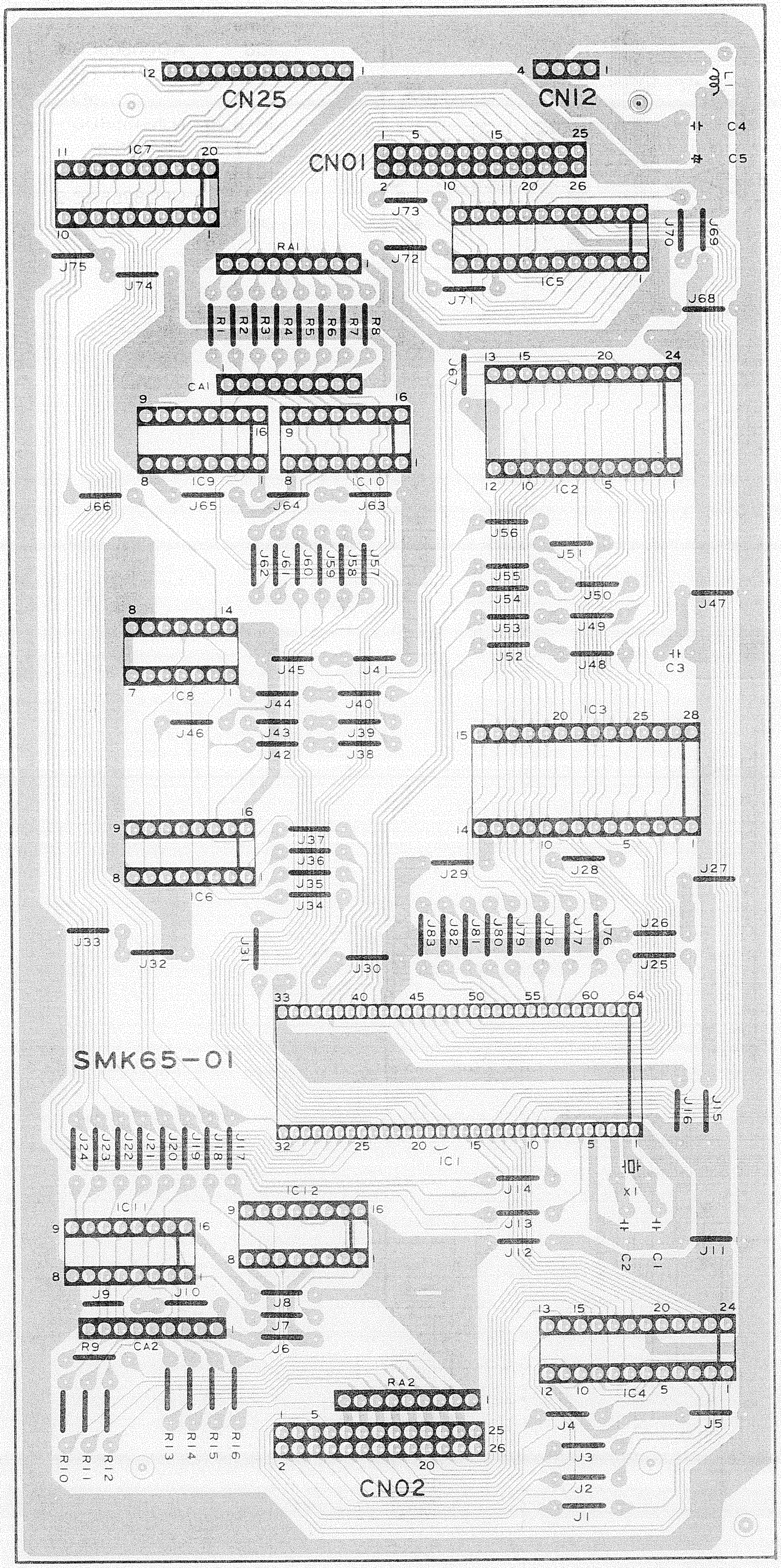
■ DG-3 P.C. Board


CN26
+7V
+5V
A/D S
A/D R
G
D.GND
IC9 VC4061
IC19
IC20
IC8 ADC0809
IC16 74HC244
IC15 74HC245
IC7 μPD8255AC-2
IC17 TC4066
CN24
CN19
To CP-R
CN22
Y34
To CP-L
CN21
RESET
TEMPO
SOLO
UPER
BASS
LOWER
ACCOMP
USC
LSC
BSC
A.GND
N C
CN23
Y40
To CP-L
To CP-R
CN13
-7V
+7V
A.GND
R.REV
R.R
R.L
RRC
AUTO
SYM
MUTE
To SE
CN17
CN18
To SY-2
To SY-1

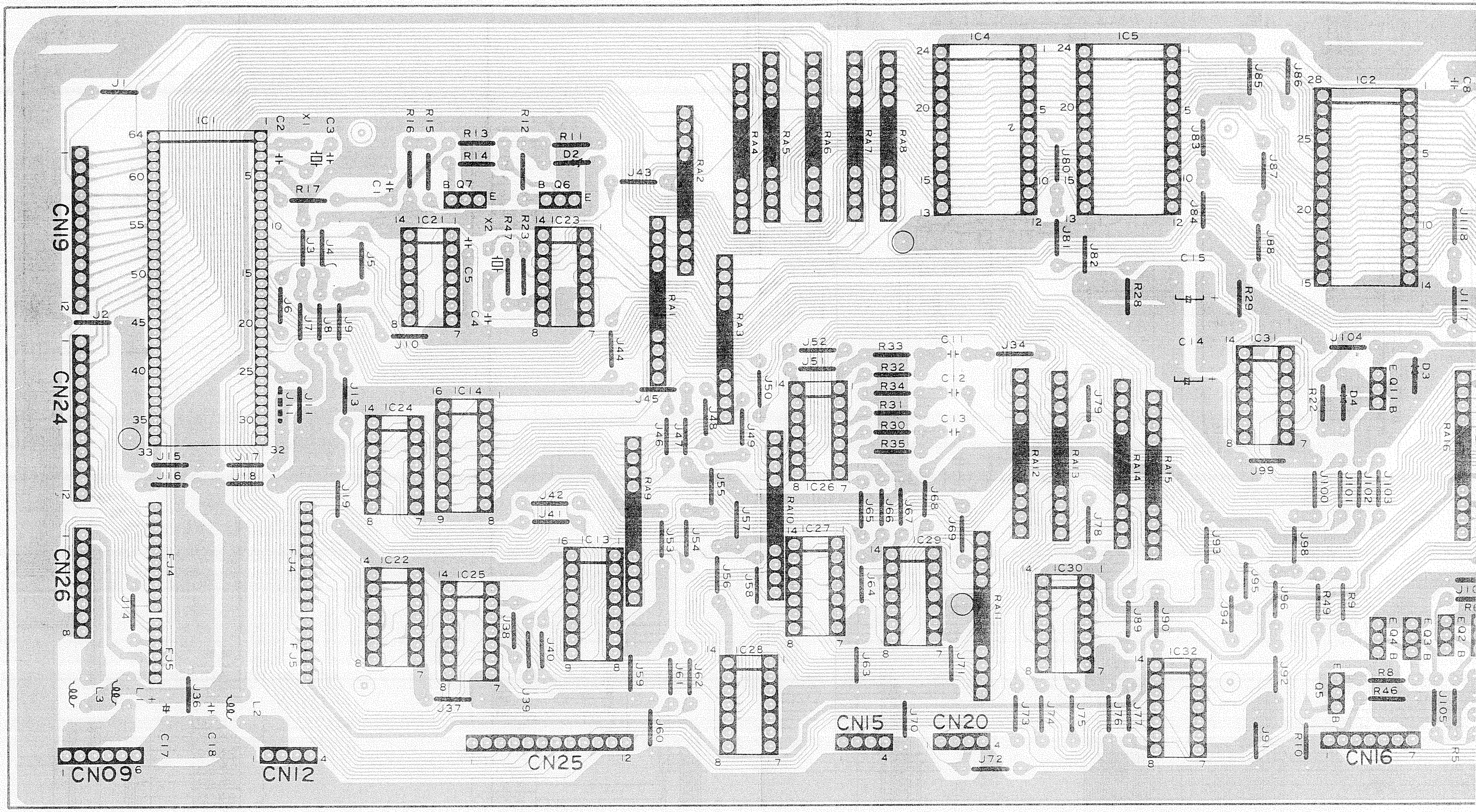
Note:

IC8	ADC0809CCN
IC15	LR74HC-245
IC16	〃 -244
IC19,20	NJM4558DD
IC17	TC4066BP
IC18	TC74HC04P
IC7	UPD8255AC-2
D4	1S1555

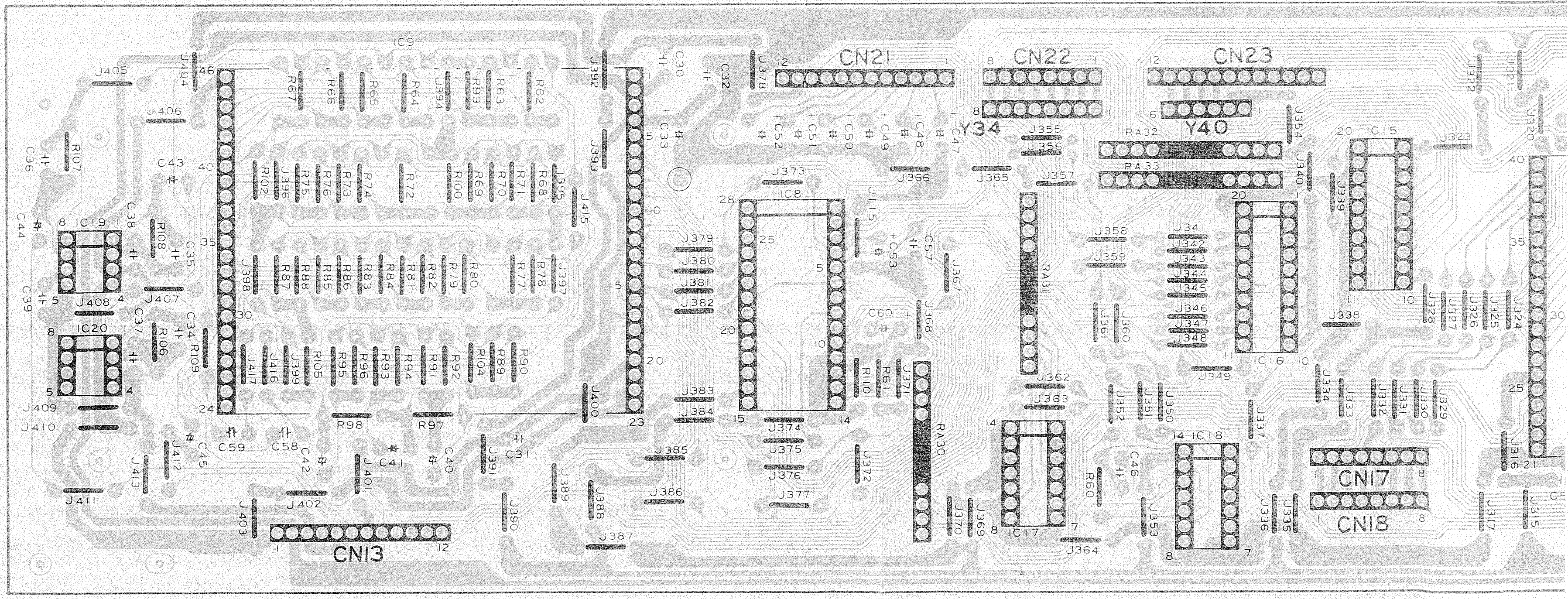
DG-1 P.C. Board

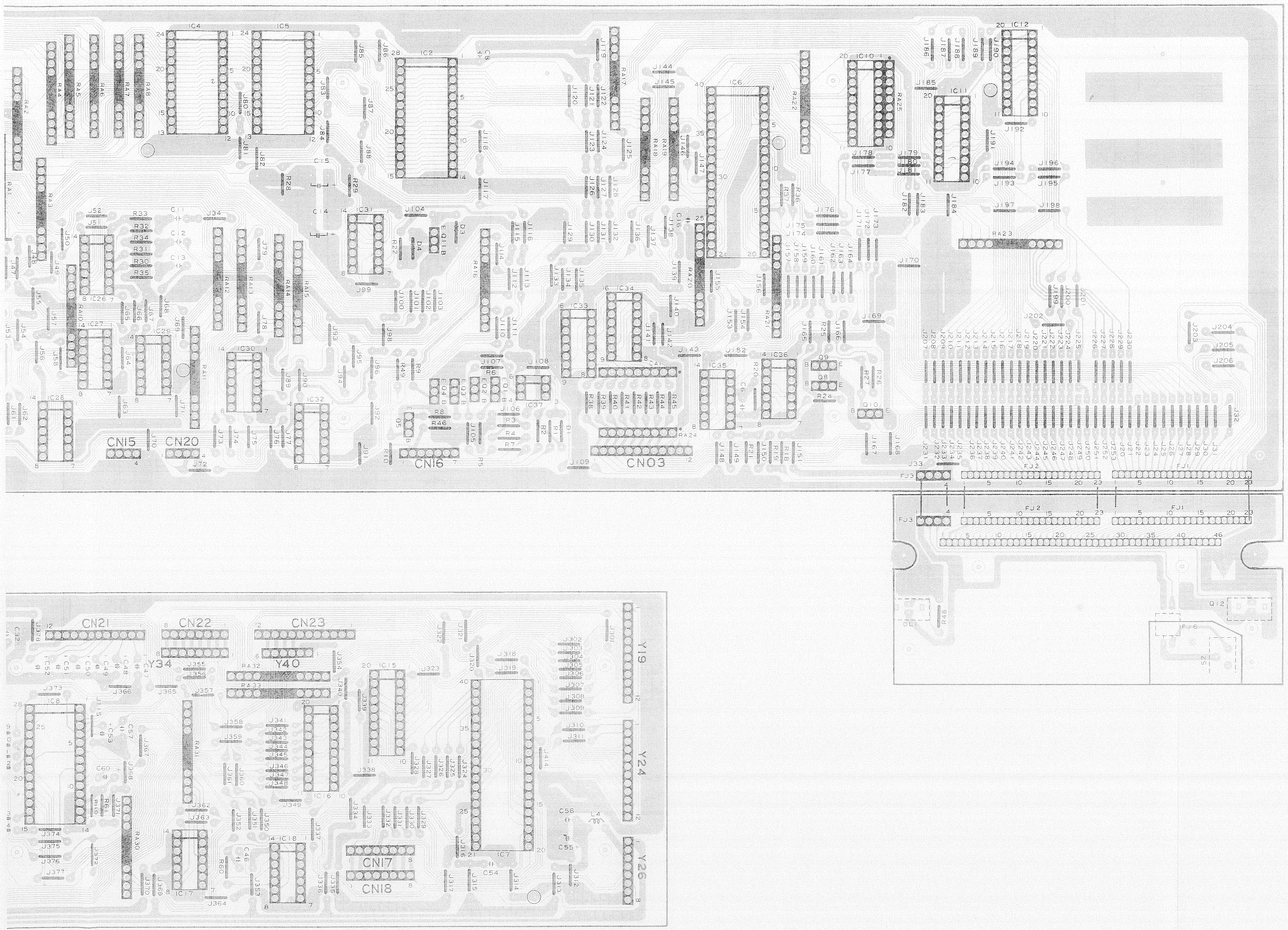

CN25
CN12
CN01
CN02
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
RA1
RA2
CA1
CA2
SMK65-01
L1
C1
C2
C3
C4
C5
X1

DG-2 P.C. Board

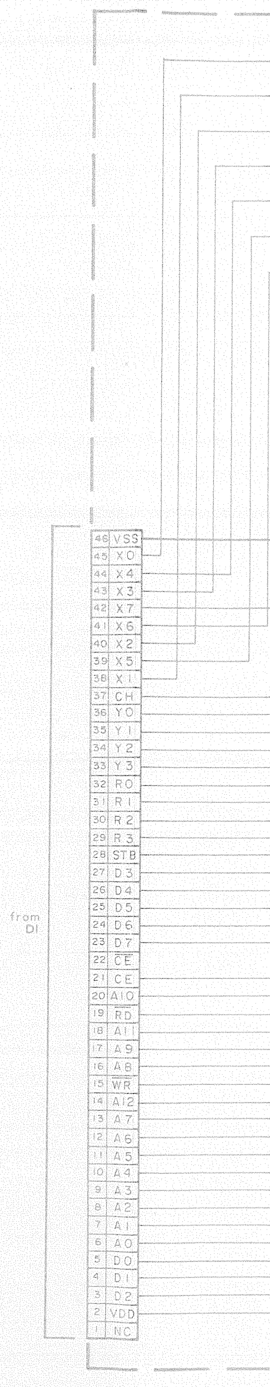

CN19
CN24
CN26
CN09
CN12
CN25
CN15
CN20
CN16
IC1
IC2
IC4
IC5
IC13
IC14
IC21
IC22
IC23
IC24
IC25
IC26
IC27
IC28
IC29
IC30
IC31
IC32
Q5
Q6
Q7
X1
X2

DG-3 P.C. Board

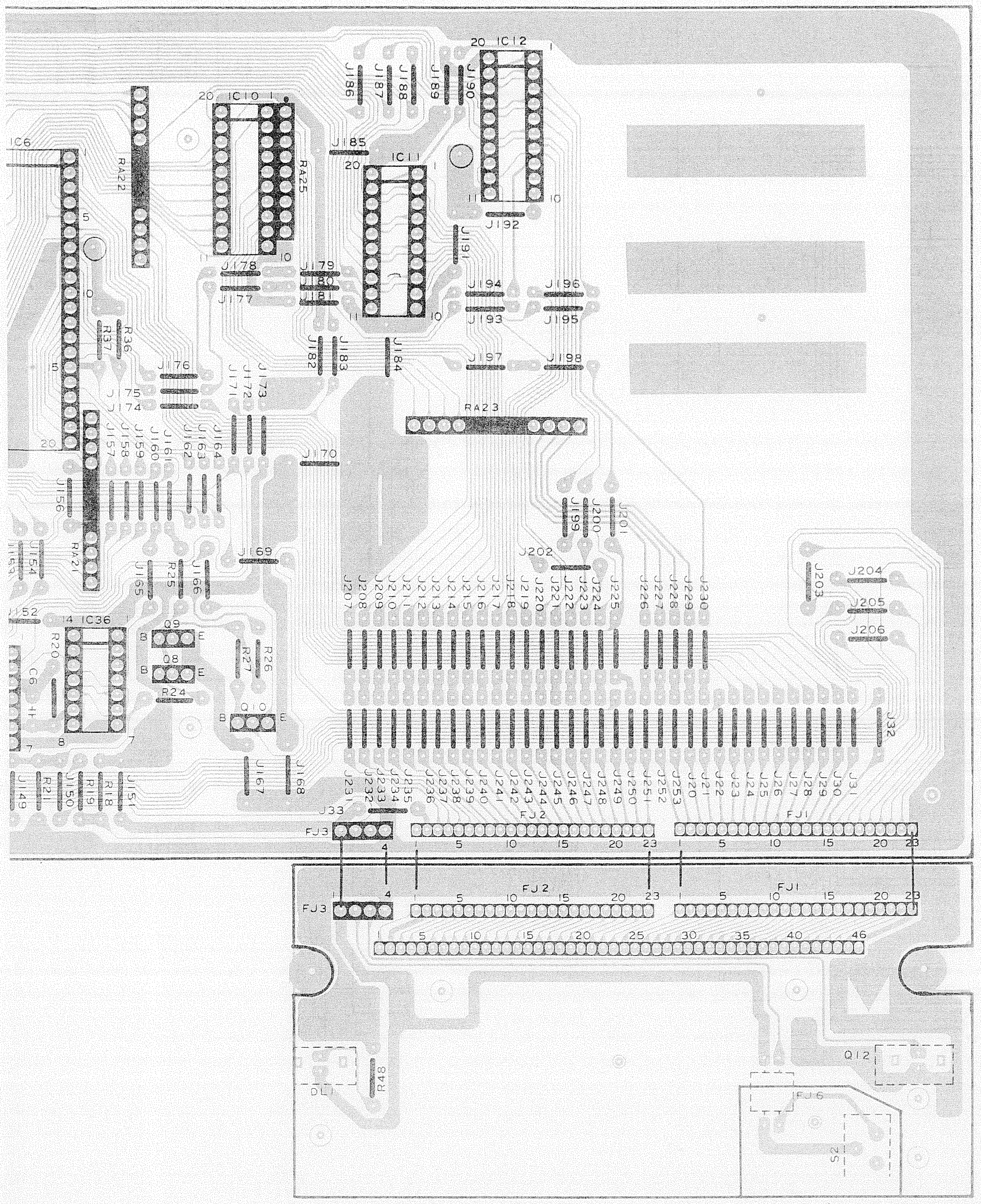

CN21
CN22
CN23
CN13
CN17
CN18
IC8
IC9
IC15
IC16
IC17
IC18
IC19
IC20
Y34
Y40
RA30
RA31
RA32
RA33


IC2
IC4
IC5
IC6
IC10
IC11
IC12
IC26
IC27
IC28
IC29
IC30
IC31
IC32
IC33
IC34
IC35
IC36
IC37
CN15
CN20
CN16
CN03
FJ1
FJ2
FJ3
Q12
CN21
CN22
CN23
Y34
Y40
IC15
IC16
IC8
IC7
IC17
IC18
CN17
CN18
Y19
Y24
Y26

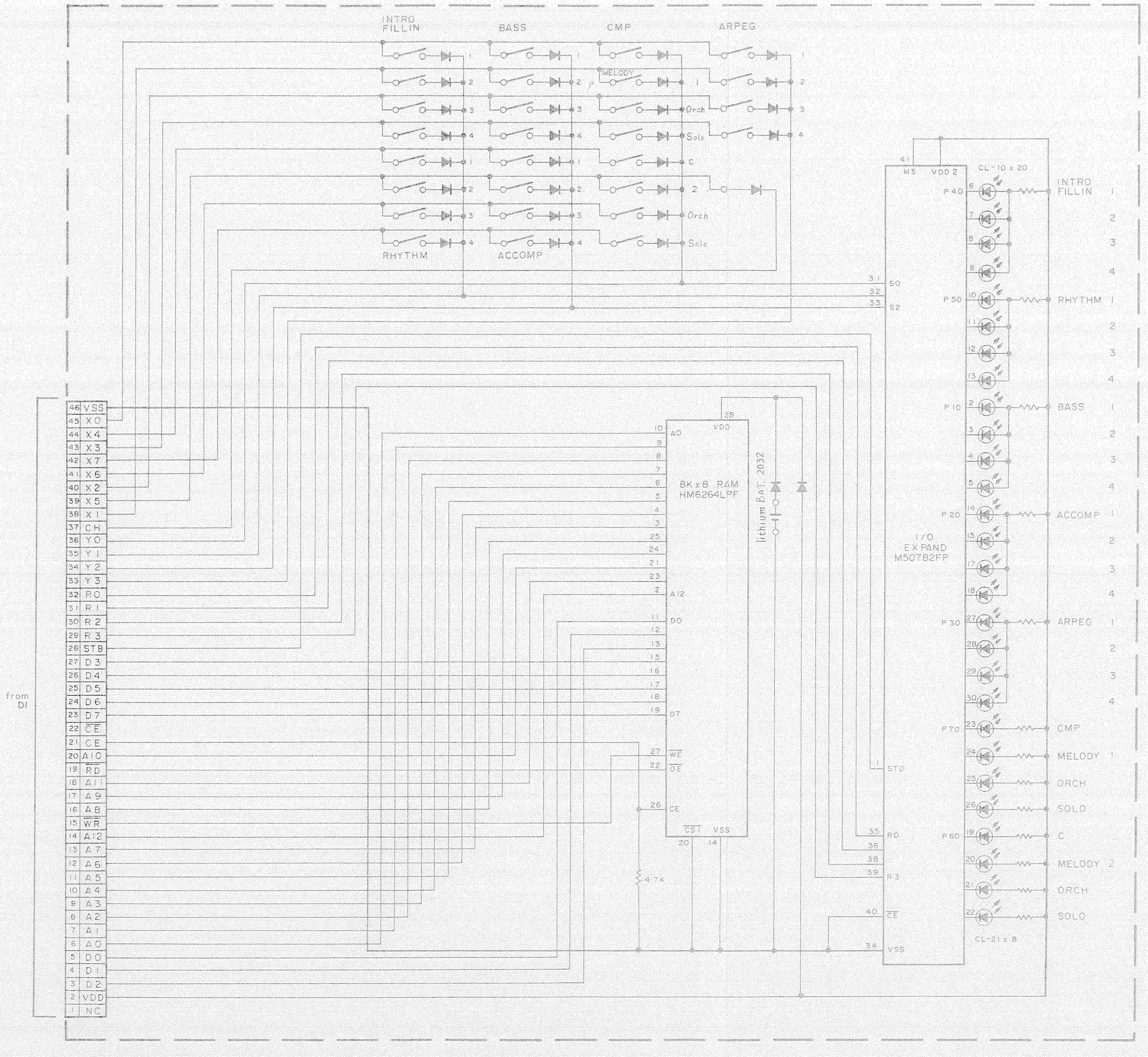
■ KE-10 Digit


from DI
46 VSS
45 X0
44 X4
43 X3
42 X7
41 X6
40 X2
39 X5
38 X1
37 CH
36 Y0
35 Y1
34 Y2
33 Y3
32 R0
31 R1
30 R2
29 R3
28 STB
27 D3
26 D4
25 D5
24 D6
23 D7
22 CE
21 CE
20 A10
19 RD
18 A11
17 A9
16 A8
15 WR
14 A12
13 A7
12 A6
11 A5
10 A4
9 A3
8 A2
7 A1
6 A0
5 D0
4 D1
3 D2
2 VDD
1 NC

Notes: • Lithium
• Any pie

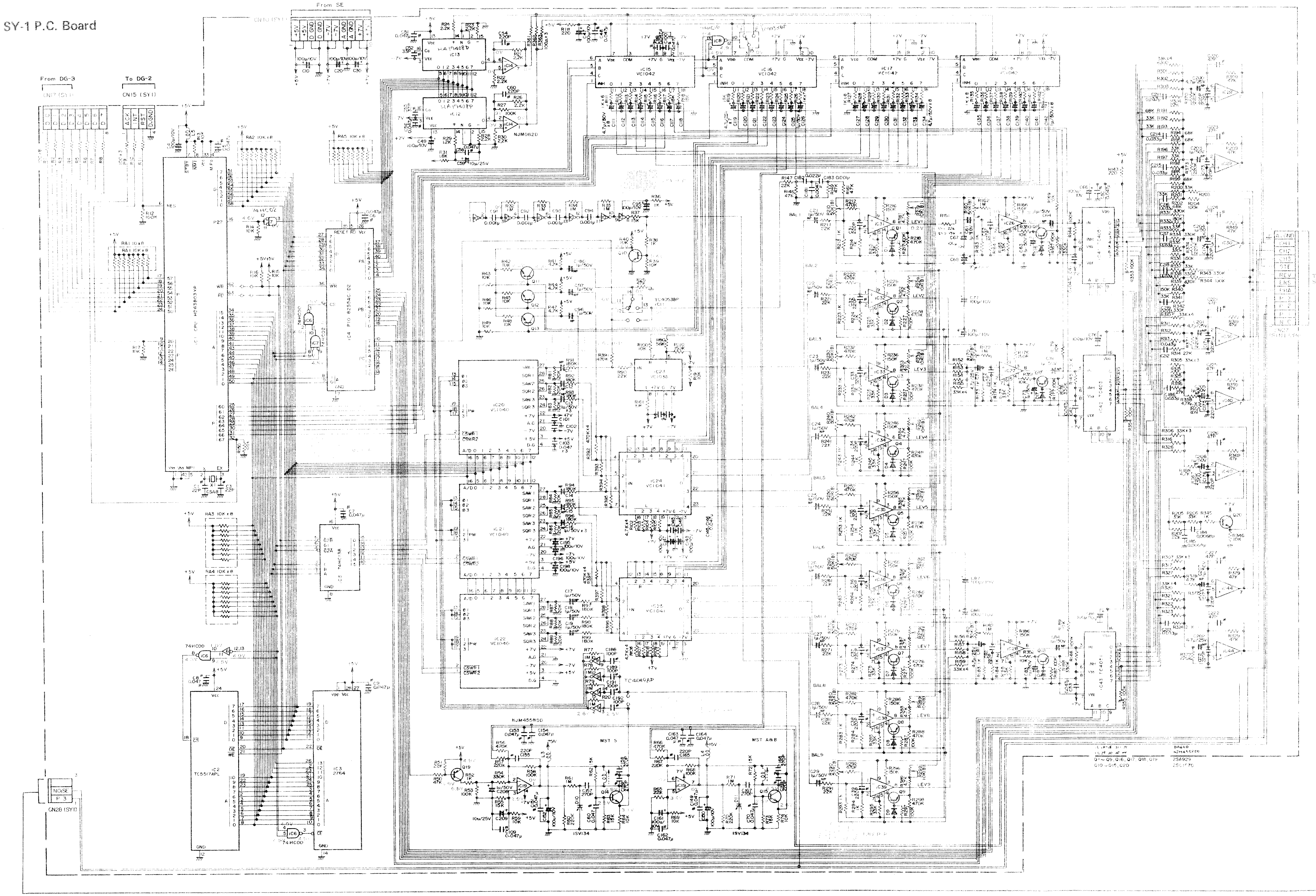

IC10
IC11
IC12
IC36
IC6
RA21
RA22
RA23
RA24
RA25
Q8
Q9
Q10
Q12
FJ1
FJ2
FJ3
FJ6
DL1
R48
S2
J32
J33

■ KE-10 Digital Composer

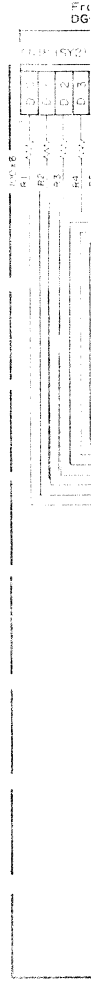

INTRO FILLIN
BASS
CMP
ARPEG
MELODY
Orch
Solo
C
RHYTHM
ACCOMP
from DI
VSS
VDD
NC
8K x 8 RAM HM6264LPF
lithium BAT 2032
4.7K
I/O EXPAND M50782FP
CL-10 x 20
CL-21 x 8
INTRO FILLIN
RHYTHM
BASS
ACCOMP
ARPEG
CMP
MELODY 1
ORCH
SOLO
C
MELODY 2
ORCH
SOLO

Notes: • Lithium battery is of '2032 type' (service life: 2 years).
• Any piece of parts of this unit won't be supplied for replacement.

■ SY-1 P.C. Board

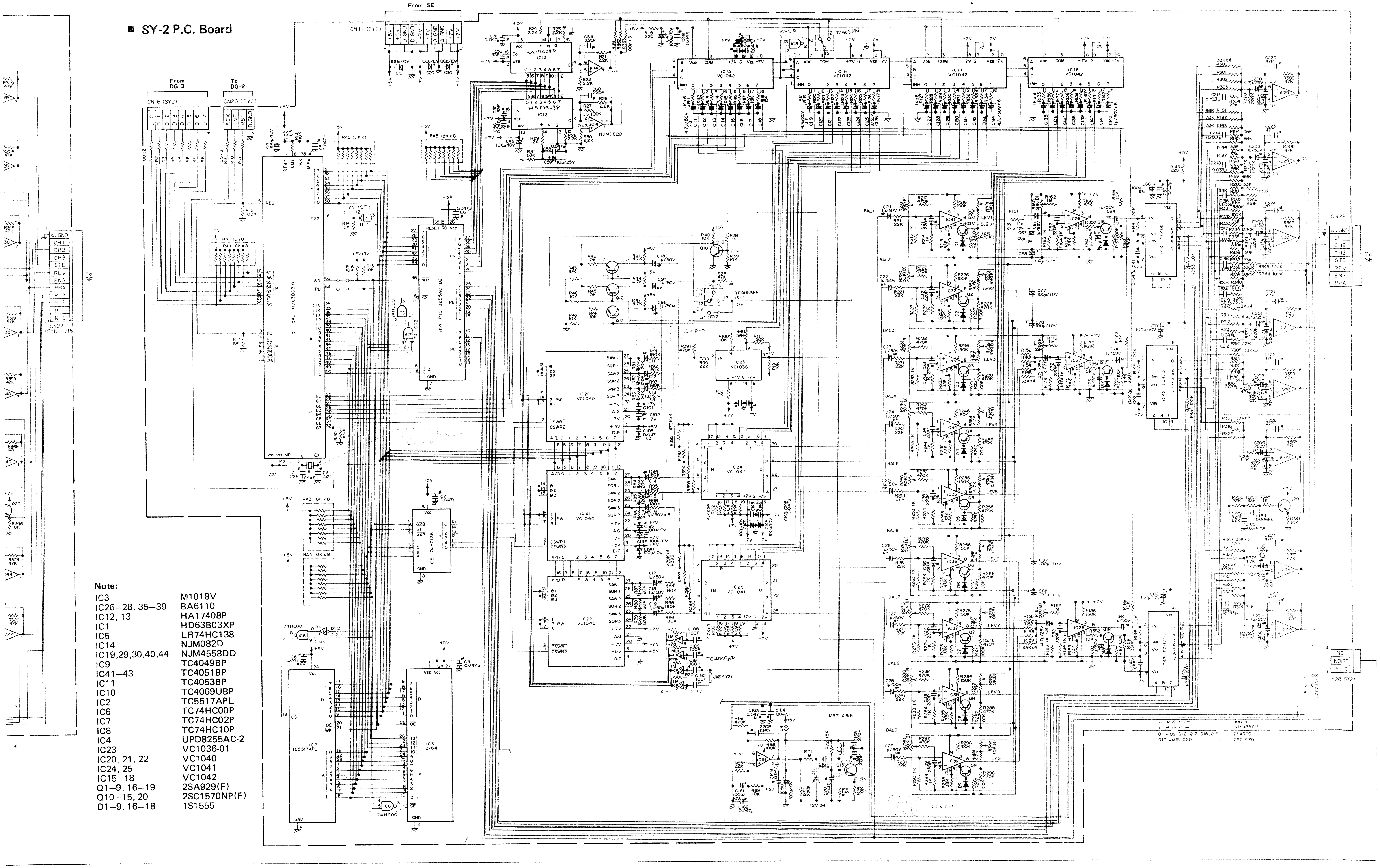

From SE
From DG-3
To DG-2
CN15 (SY1)
NOISE
P3
CN28 (SY1)
IC1 CPU HD63B03X
IC4 PIO 82C55AC-02
IC2 TC5517APL
IC3 2764
IC5 74HC138
IC6 74HC00
IC12
IC13
IC14 NJM082D
IC15 VC1042
IC16 VC1042
IC17 VC1042
IC18 VC1042
IC20 VC1040
IC21 VC1040
IC22 VC1040
IC24 VC1041
IC25 VC1041
IC23 TC4049BP
NJM4558DD
MST S
MST A&B
1SV134
BAL1
BAL2
BAL3
BAL4
BAL5
BAL6
BAL7
BAL8
BAL9
LEV1
LEV2
LEV3
LEV4
LEV5
LEV6
LEV7
LEV8
LEV9
IC41 TC4051
IC42 TC4051
IC43 TC4051
To SE

■ SY-2 P



Note:
IC3
IC26–28, 35–39
IC12, 13
IC1
IC5
IC14
IC19,29,30,40,44
IC9
IC41–43
IC11
IC10
IC2
IC6
IC7
IC8
IC4
IC23
IC20, 21, 22
IC24, 25
IC15–18
Q1–9, 16–19
Q10–15, 20
D1–9, 16–18

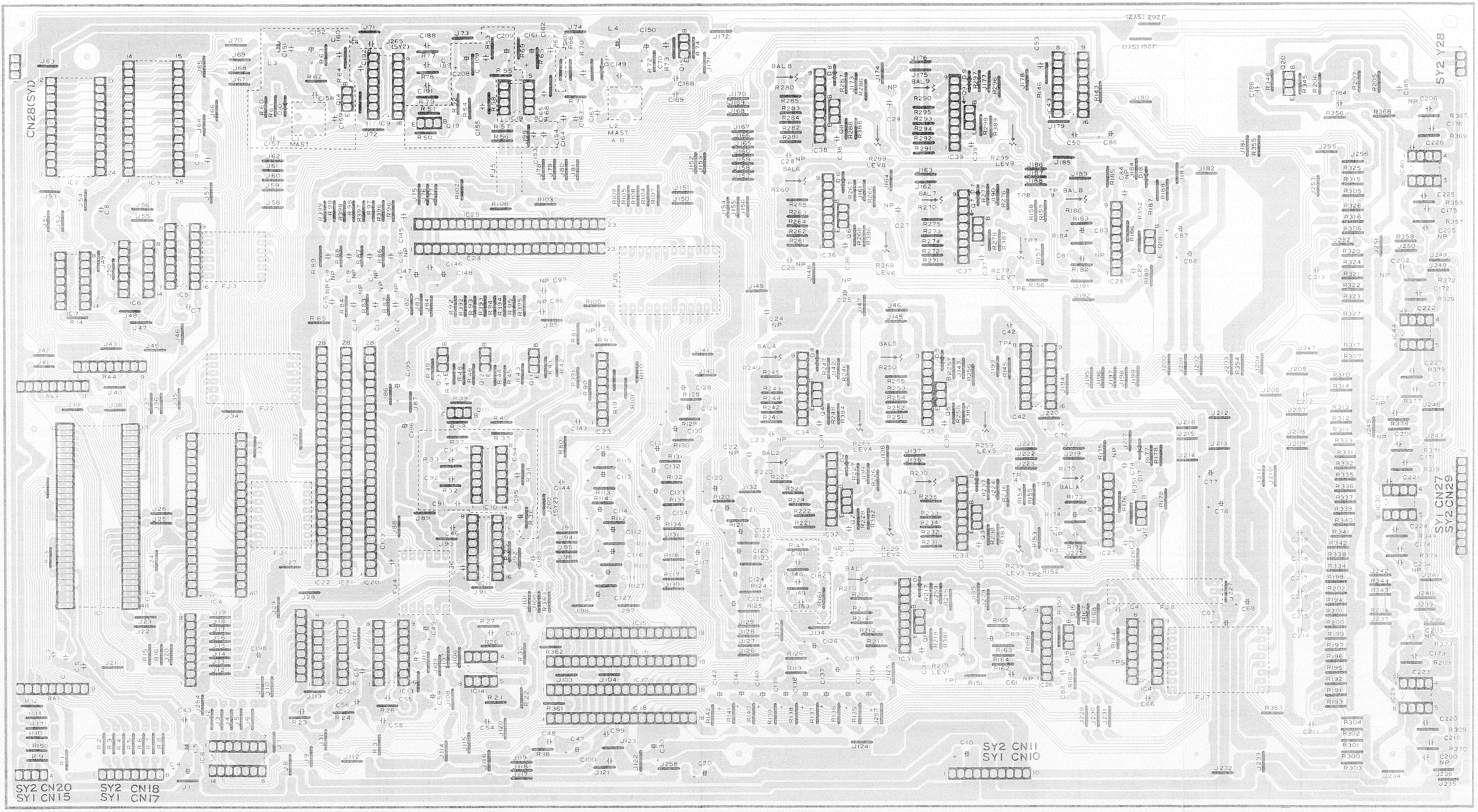
■ SY-2 P.C. Board


From SE
CN11 (SY2)
From DG-3
To DG-2
CN18 (SY2)
CN20 (SY2)
ACK
INT
RST
D.GND
IC1 CPU HD63B03XP
IC4 PIO 8255AC-02
IC5 74HC138
IC2 TC5517APL
IC3 2764
IC6 74HC00
IC7 74HC02
IC8 74HC10
IC9 TC4049BP
IC10
IC11 TC4053BP
IC12 HA17408P
IC13 HA17408P
IC14 NJM082D
IC15 VC1042
IC16 VC1042
IC17 VC1042
IC18 VC1042
IC19
IC20 VC1040
IC21 VC1040
IC22 VC1040
IC23 VC1036
IC24 VC1041
IC25 VC1041
IC41 TC4051
IC42 TC4051
IC43 TC4051
MST ABB
1SV134
BAL1
BAL2
BAL3
BAL4
BAL5
BAL6
BAL7
BAL8
BAL9
LEV1
LEV2
LEV3
LEV4
LEV5
LEV6
LEV7
LEV8
LEV9
CN27 (SYN1 D(4))
A.GND
CH1
CH2
CH3
STE
REV
ENS
PHA
P3
P2
P
NC
To SE
CN29
To SE
NC
NOISE
P3
Y2B (SY2)
SY2
SY1
1.5V P-P
3.8V P-P

Note:

IC3	M1018V
IC26–28, 35–39	BA6110
IC12, 13	HA17408P
IC1	HD63B03XP
IC5	LR74HC138
IC14	NJM082D
IC19,29,30,40,44	NJM4558DD
IC9	TC4049BP
IC41–43	TC4051BP
IC11	TC4053BP
IC10	TC4069UBP
IC2	TC5517APL
IC6	TC74HC00P
IC7	TC74HC02P
IC8	TC74HC10P
IC4	UPD8255AC-2
IC23	VC1036-01
IC20, 21, 22	VC1040
IC24, 25	VC1041
IC15–18	VC1042
Q1–9, 16–19	2SA929(F)
Q10–15, 20	2SC1570NP(F)
D1–9, 16–18	1S1555

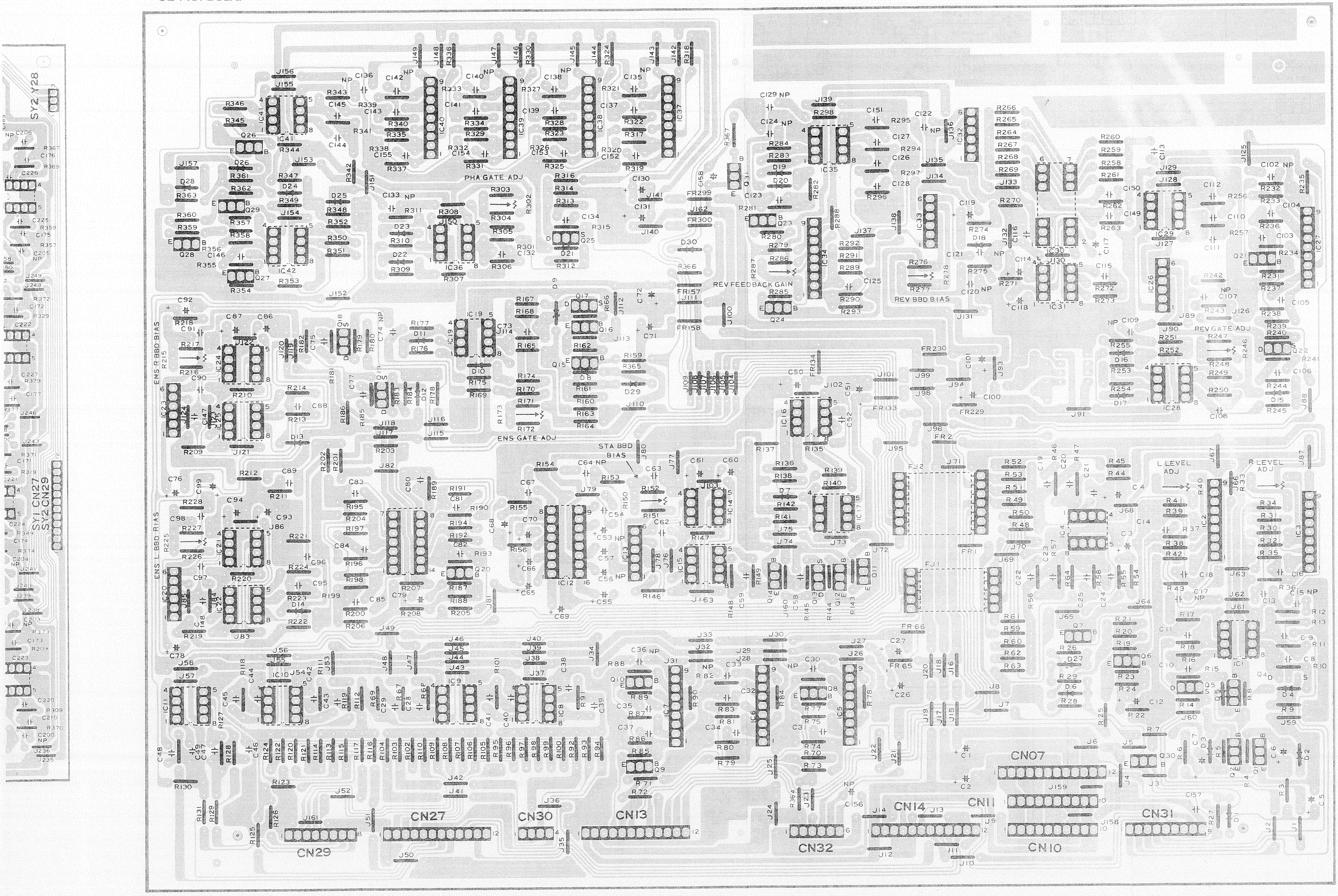
■ SY-1, SY-2 P.C. Board


CN28(SY1)
SY2 CN20
SY1 CN15
SY2 CN18
SY1 CN17
SY2 CN11
SY1 CN10
SY1 CN27
SY2 CN29
SY2 Y28
MAST
L1
L2
L3
L4
J265 (SY2)
J262 (SY2)
J261 (SY1)
FJ1
FJ2
FJ3
FJ4
FJ5
FJ6
FJ7
FJ8
LEV1
LEV2
LEV3
LEV4
LEV5
LEV6
LEV7
LEV8
LEV9
BAL 1
BAL 2
BAL 3
BAL 4
BAL 5
BAL 6
BAL 7
BAL 8
BAL 9
BAL A
BAL B
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TPA

■ SE

ENS R BBD BIAS
ENS L BBD BIAS

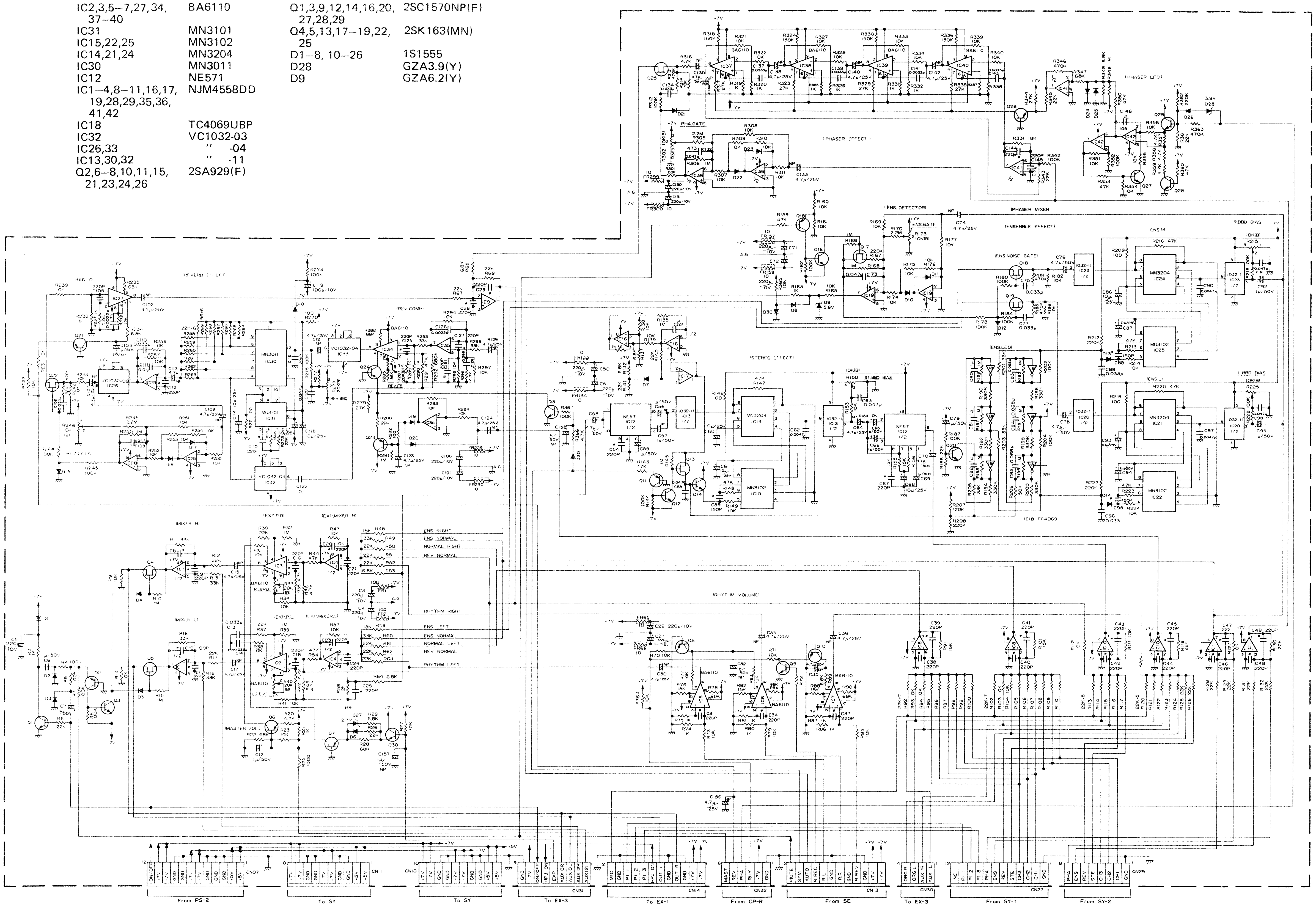
■ SE P.C. Board


PHA GATE ADJ
REV FEEDBACK GAIN
REV BBD BIAS
REV GATE ADJ
ENS-R BBD BIAS
ENS GATE ADJ
STA BBD BIAS
ENS-L BBD BIAS
L LEVEL ADJ
R LEVEL ADJ
CN29
CN27
CN30
CN13
CN32
CN14
CN11
CN07
CN10
CN31
SY2 Y28
SY1 CN27
SY2 CN29

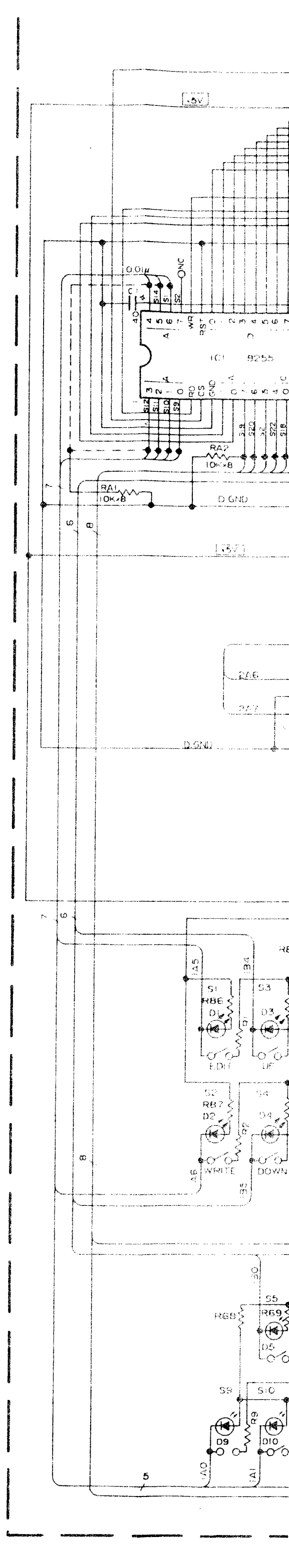
■ SE P.C. Board

Note:

IC2,3,5–7,27,34, 37–40	BA6110	Q1,3,9,12,14,16,20, 27,28,29	2SC1570NP(F)
IC31	MN3101	Q4,5,13,17–19,22, 25	2SK163(MN)
IC15,22,25	MN3102	D1–8, 10–26	1S1555
IC14,21,24	MN3204	D28	GZA3.9(Y)
IC30	MN3011	D9	GZA6.2(Y)
IC12	NE571		
IC1–4,8–11,16,17, 19,28,29,35,36, 41,42	NJM4558DD		
IC18	TC4069UBP		
IC32	VC1032-03		
IC26,33	″ -04		
IC13,30,32	″ -11		
Q2,6–8,10,11,15, 21,23,24,26	2SA929(F)		


(PHASER EFFECT)
(PHASER LFO)
PHA.GATE
(ENS.DETECTOR)
(PHASER MIXER)
(ENSEMBLE EFFECT)
(ENS.NOISE GATE)
(ENS.R)
(ENS.L)
(ENS.LED)
R.BBD BIAS
L.BBD BIAS
(REVERB EFFECT)
REV.COMP
(STEREO EFFECT)
(MIXER R)
(MIXER L)
(EXP.MIXER R)
(EXP.MIXER L)
(EXP.R)
(EXP.L)
(MASTER VOL)
(RHYTHM VOLUME)
ENS RIGHT
ENS NORMAL
NORMAL RIGHT
REV NORMAL
RHYTHM RIGHT
ENS LEFT
ENS NORMAL
NORMAL LEFT
REV NORMAL
RHYTHM LEFT
CN7
CN11
CN10
CN31
CN14
CN32
CN13
CN30
CN27
CN29
From PS-2
To SY
To SY
To EX-3
To EX-1
From CP-R
From SE
To EX-3
From SY-1
From SY-2

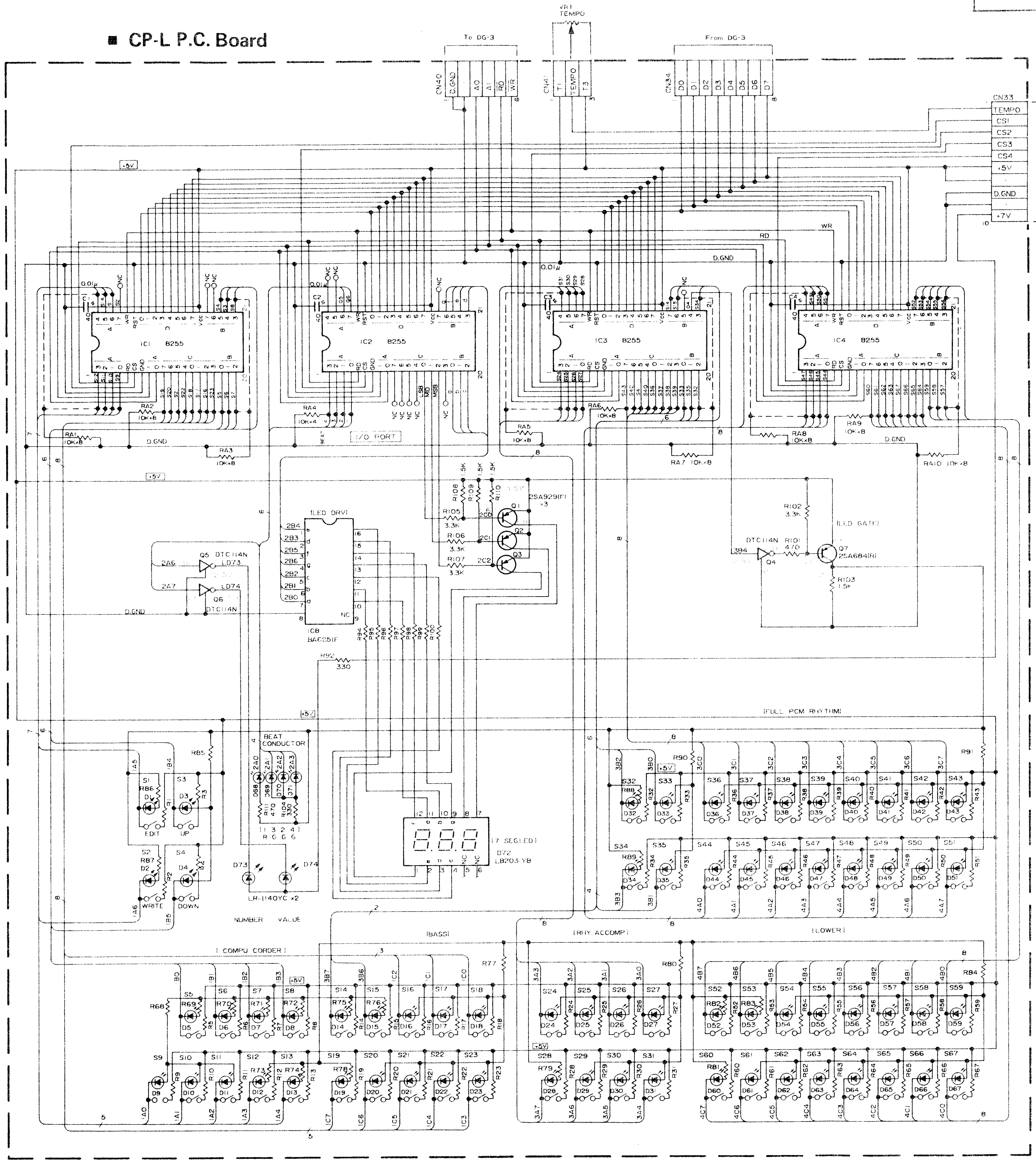
■ CP-L P.



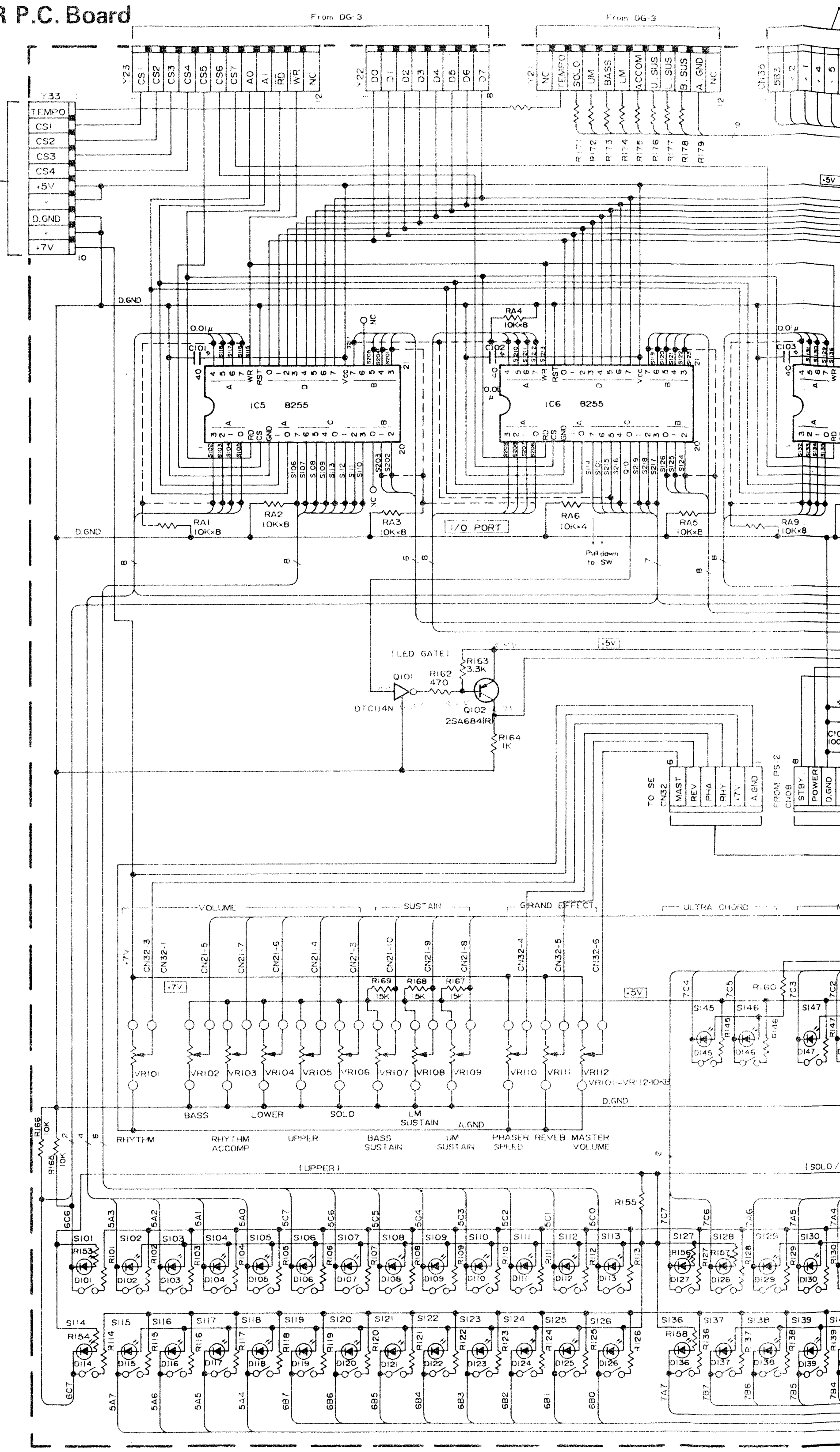
Note:

IC1–4	UPD8255AC-2
IC8	BA6251
Q7	2SA684(R)
Q1–3	DTA114N
Q4–6	DTC114N
LD72	LB203YB
LED	SLR54MC3F
LED	SLR54VC3F
LD73,74	LD603YY

CP-L P.C. Board


To DG-3
From DG-3
TEMPO
CN40
CN41
CN34
CN33
IC1 8255
IC2 8255
IC3 8255
IC4 8255
I/O PORT
LED DRV
IC8 BA6251F
LED GATE
7 SEG LED
LD72 LB203-YB
BEAT CONDUCTOR
LR-1140YC ×2
EDIT
UP
WRITE
DOWN
NUMBER
VALUE
FULL PCM RHYTHM
COMPU CORDER
BASS
RHY ACCOMP
LOWER

CP-R P.C. Board

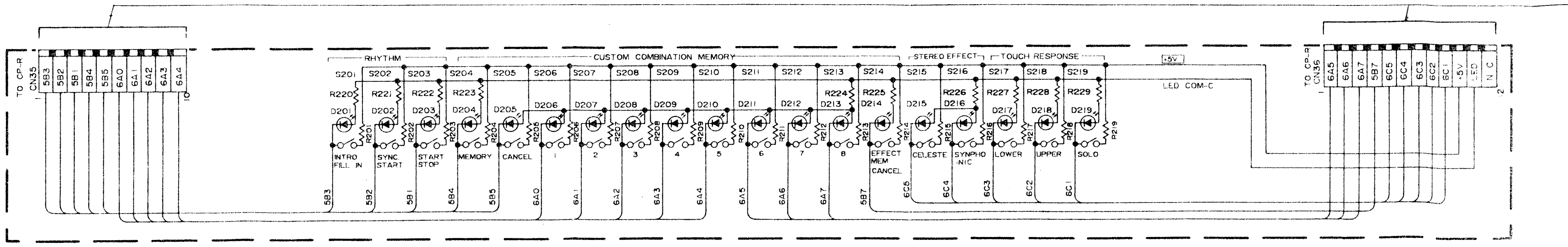

From DG-3
IC5 8255
IC6 8255
I/O PORT
LED GATE
VOLUME
SUSTAIN
GRAND EFFECT
ULTRA CHORD
RHYTHM
RHYTHM ACCOMP
BASS
LOWER
UPPER
SOLO
LM
BASS SUSTAIN
LM SUSTAIN
PHASER SPEED
REVERB
MASTER VOLUME
UPPER

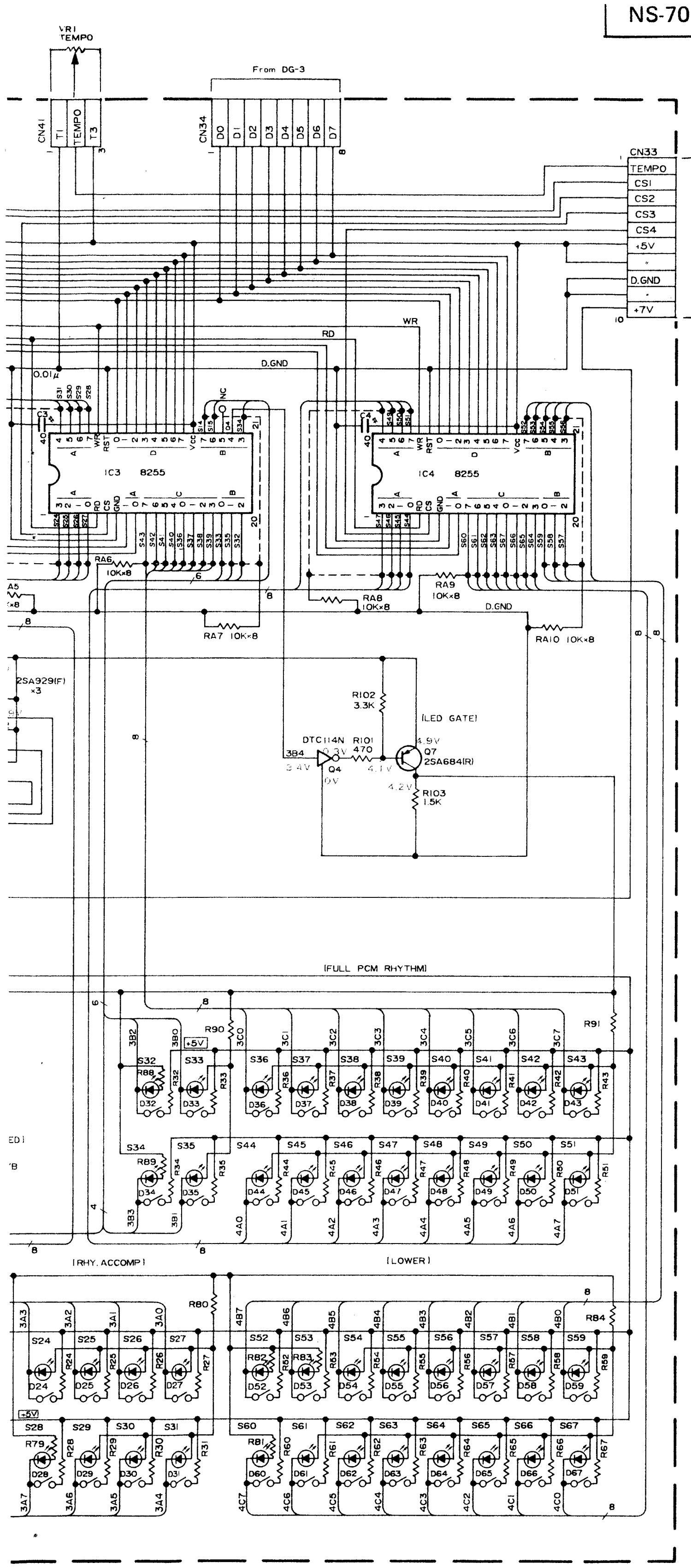
Note:

IC1–4	UPD8255AC-2
IC8	BA6251
Q7	2SA684(R)
Q1–3	DTA114N
Q4–6	DTC114N
LD72	LB203YB
LED	SLR54MC3F
LED	SLR54VC3F
LD73,74	LD603YY

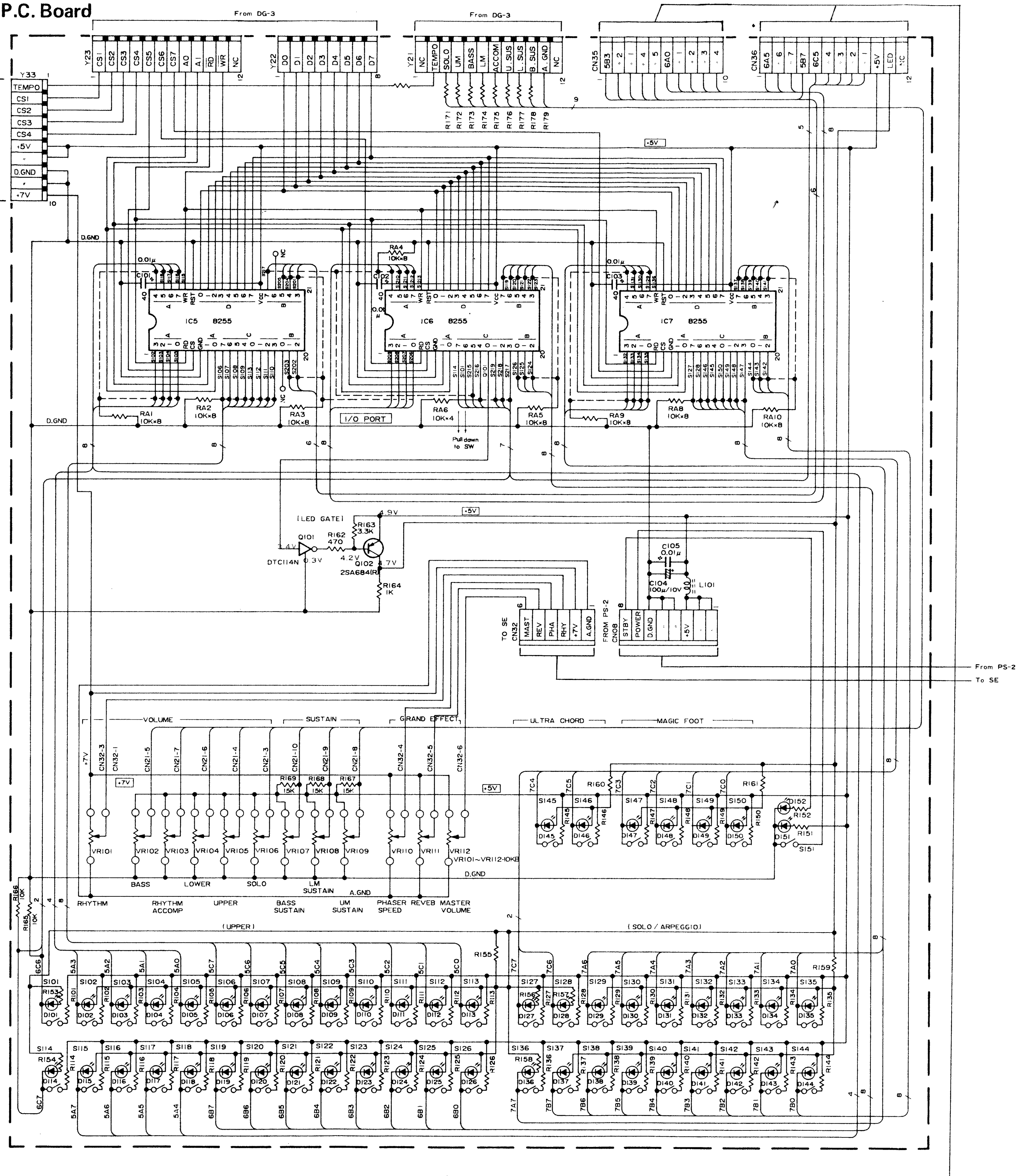
CP-C P.C. Board

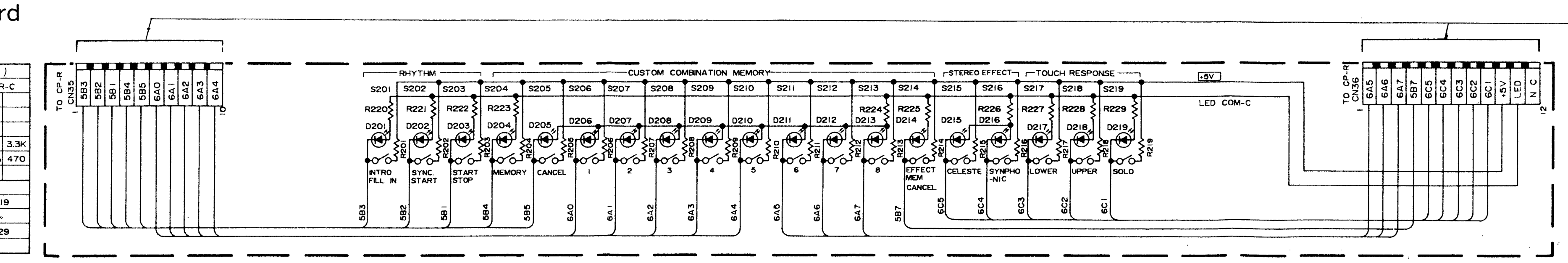
定数リスト（記入のものは除く）						
	CP-L		CP-R		CR-C	
LED	1~68					
	69~71					
R	1~67	3.3K	101~150	3.3K	201~219	3.3K
	68~91	470	151~161	470	220~229	470
	94~100	220	170~179	3.3K		
	末番					
SW	67		151		219	
LED	74		152		〃	
R	111		179		229	
C	4		105			


TO CP-R
CN35
RHYTHM
CUSTOM COMBINATION MEMORY
STEREO EFFECT
TOUCH RESPONSE
LED COM-C
INTRO FILL IN
SYNC START
START STOP
MEMORY
CANCEL
EFFECT MEM CANCEL
CELESTE
SYMPHONIC
LOWER
UPPER
SOLO
TO CP-R
CN36


VR1
TEMPO
From DG-3
CN41
CN34
CN33
IC3 8255
IC4 8255
RD
WR
D.GND
LED GATE
DTC114N
Q4
Q7
2SA684(R)
R102 3.3K
R101 470
R103 1.5K
2SA929(F) ×3
FULL PCM RHYTHM
RHY. ACCOMP
LOWER
R80
R84
R90
R91

■ CP-R P.C. Board


From DG-3
From DG-3
CN35
CN36
Y33
TEMPO
CS1
CS2
CS3
CS4
+5V
D.GND
+7V
IC5 8255
IC6 8255
IC7 8255
I/O PORT
Pull down to SW
LED GATE
Q101
Q102
DTC114N
2SA684(R)
R162 470
R163 3.3K
R164 1K
C104 100μ/10V
C105 0.01μ
L101
TO SE CN32
FROM PS-2 CN08
From PS-2
To SE
VOLUME
SUSTAIN
GRAND EFFECT
ULTRA CHORD
MAGIC FOOT
VR101~VR112:10KB
RHYTHM
RHYTHM ACCOMP
UPPER
BASS SUSTAIN
UM SUSTAIN
PHASER SPEED
REVEB
MASTER VOLUME
BASS
LOWER
SOLO
LM SUSTAIN
A.GND
D.GND
UPPER
SOLO / ARPEGGIO


TO CP-R CN35
RHYTHM
CUSTOM COMBINATION MEMORY
STEREO EFFECT
TOUCH RESPONSE
+5V
LED COM-C
INTRO FILL IN
SYNC START
START STOP
MEMORY
CANCEL
1
2
3
4
5
6
7
8
EFFECT MEM CANCEL
CELESTE
SYMPHO-NIC
LOWER
UPPER
SOLO
TO CP-R CN36

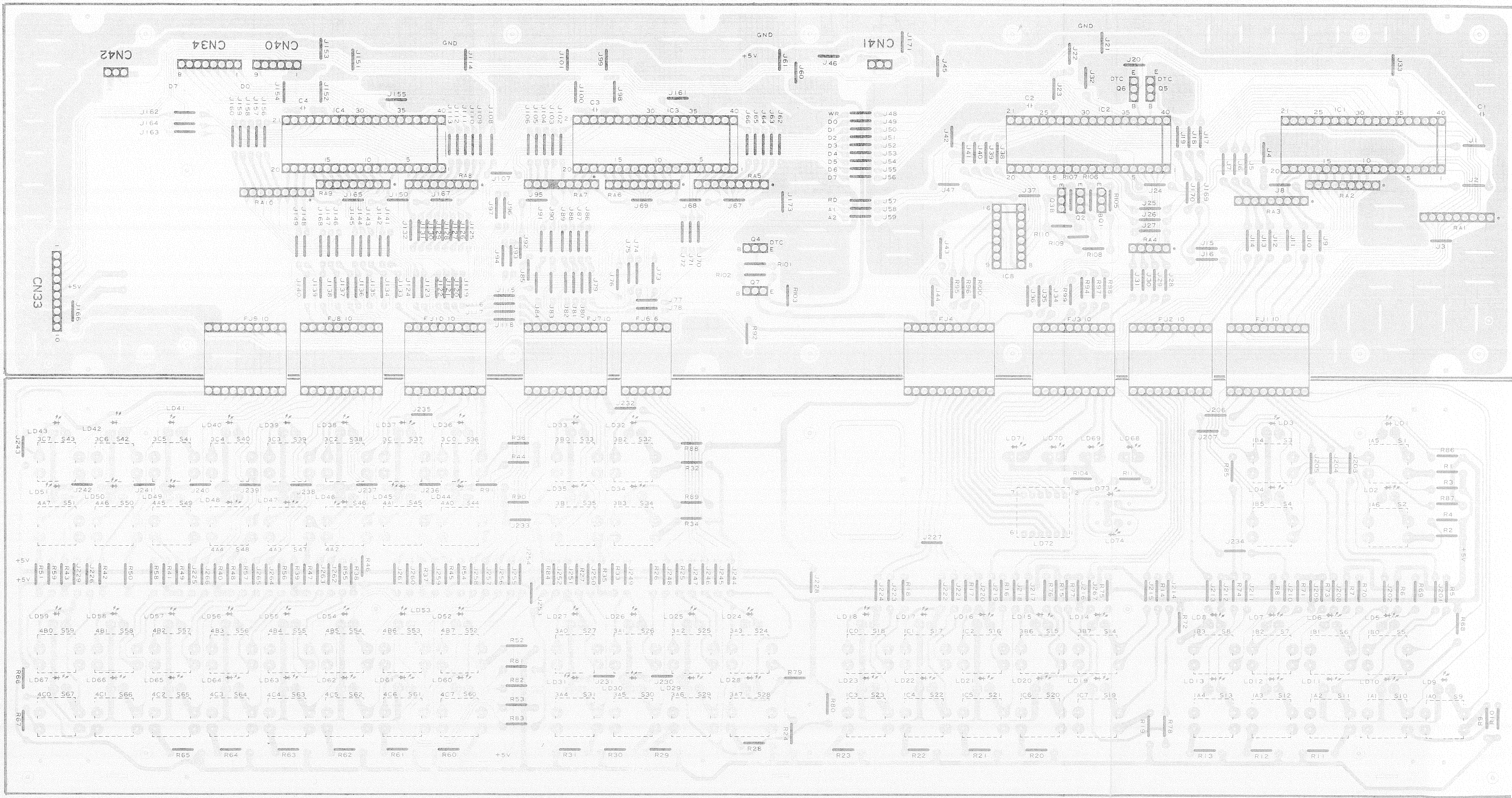
.C. Board

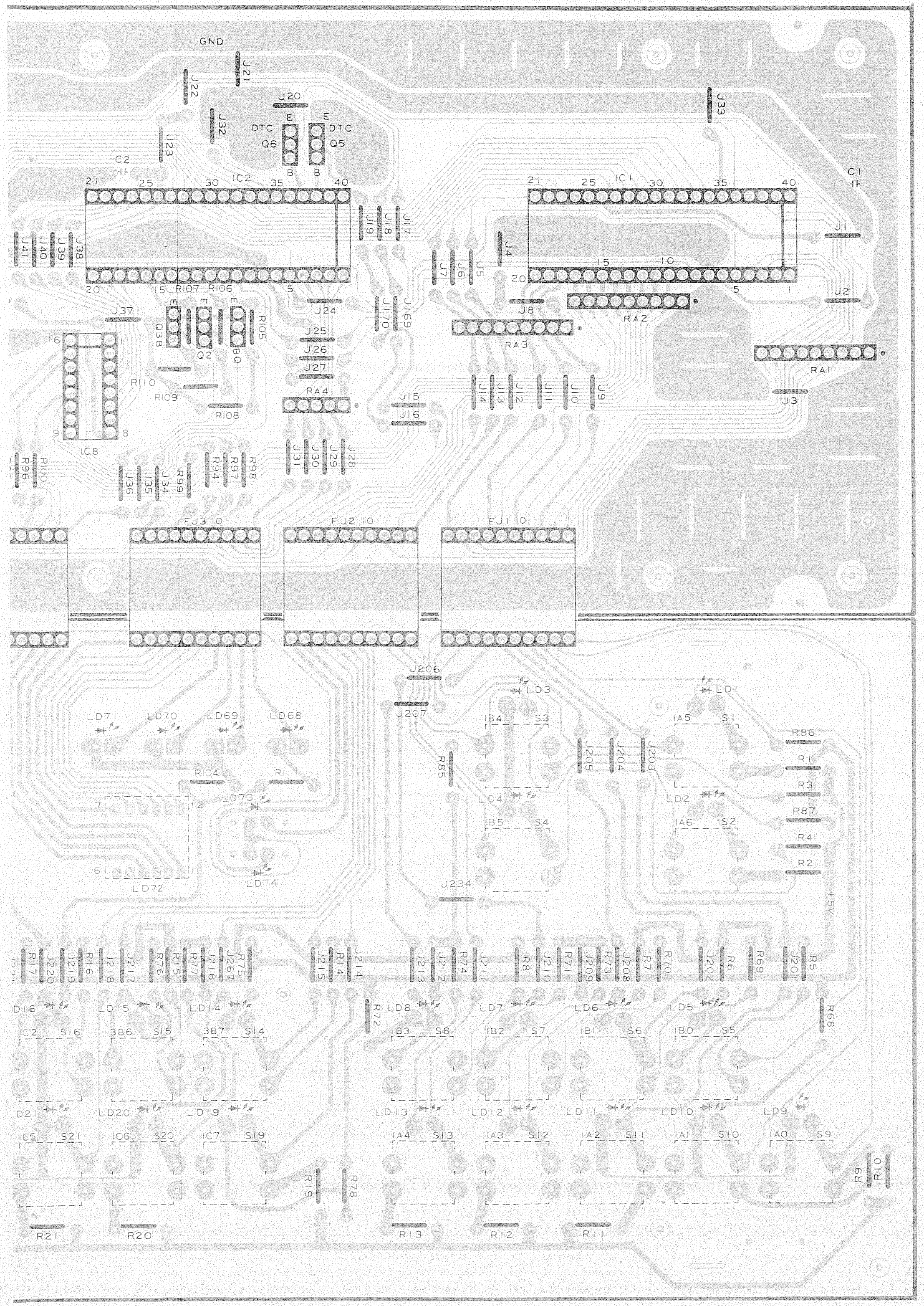
（記入のものは除く）			
CP-R		CR-C	
01~150	3.3K	201~219	3.3K
51~161	470	220~229	470
70~179	3.3K		
未番			
151		219	
152		〃	
179		229	
105			

Note:

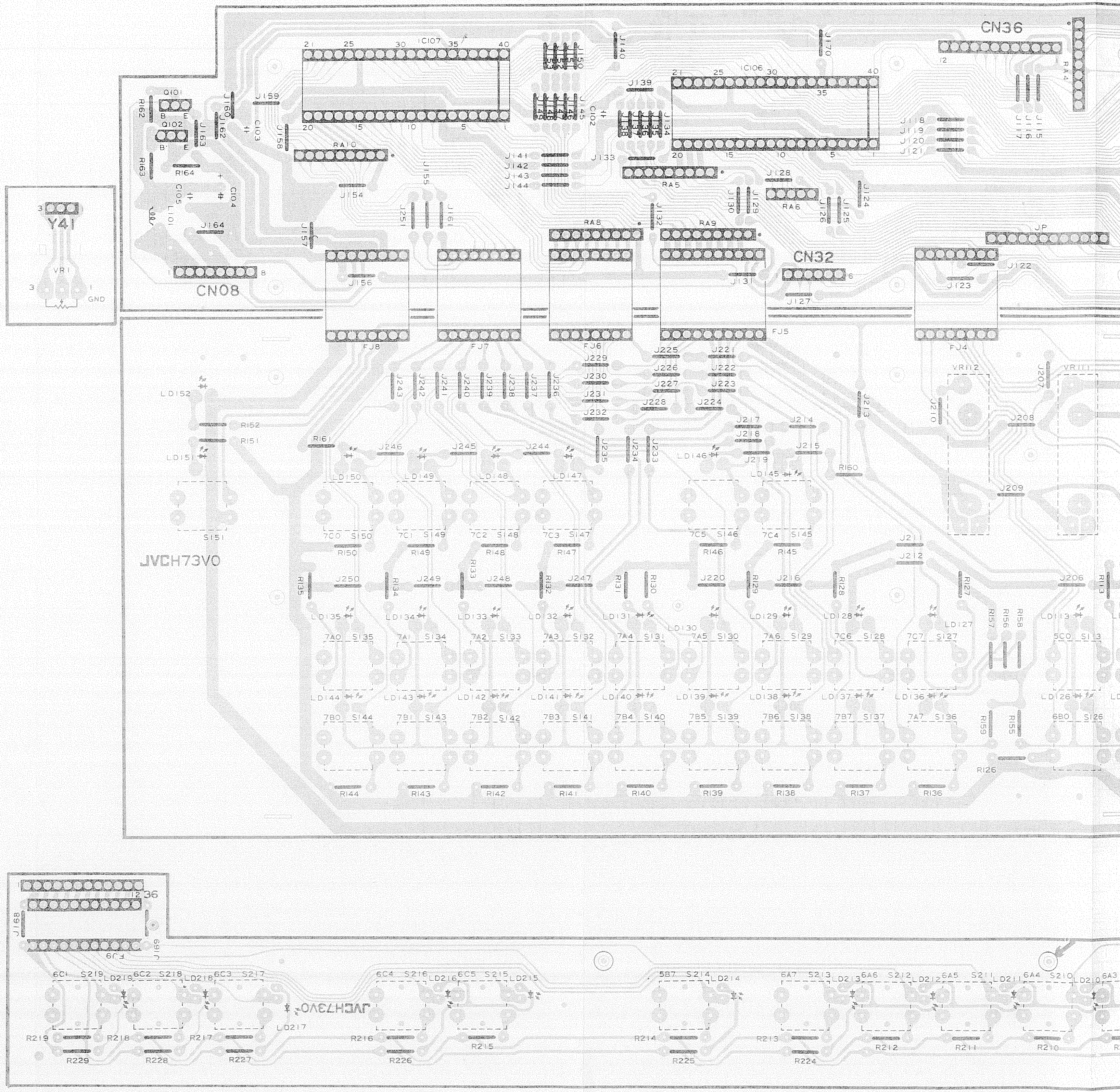
IC5, 6, 7	UPD8255AC-2
Q102	2SA684(R)
Q101	DTC114N
LED	SLR-54VC3F

■ CP-L P.C. Board

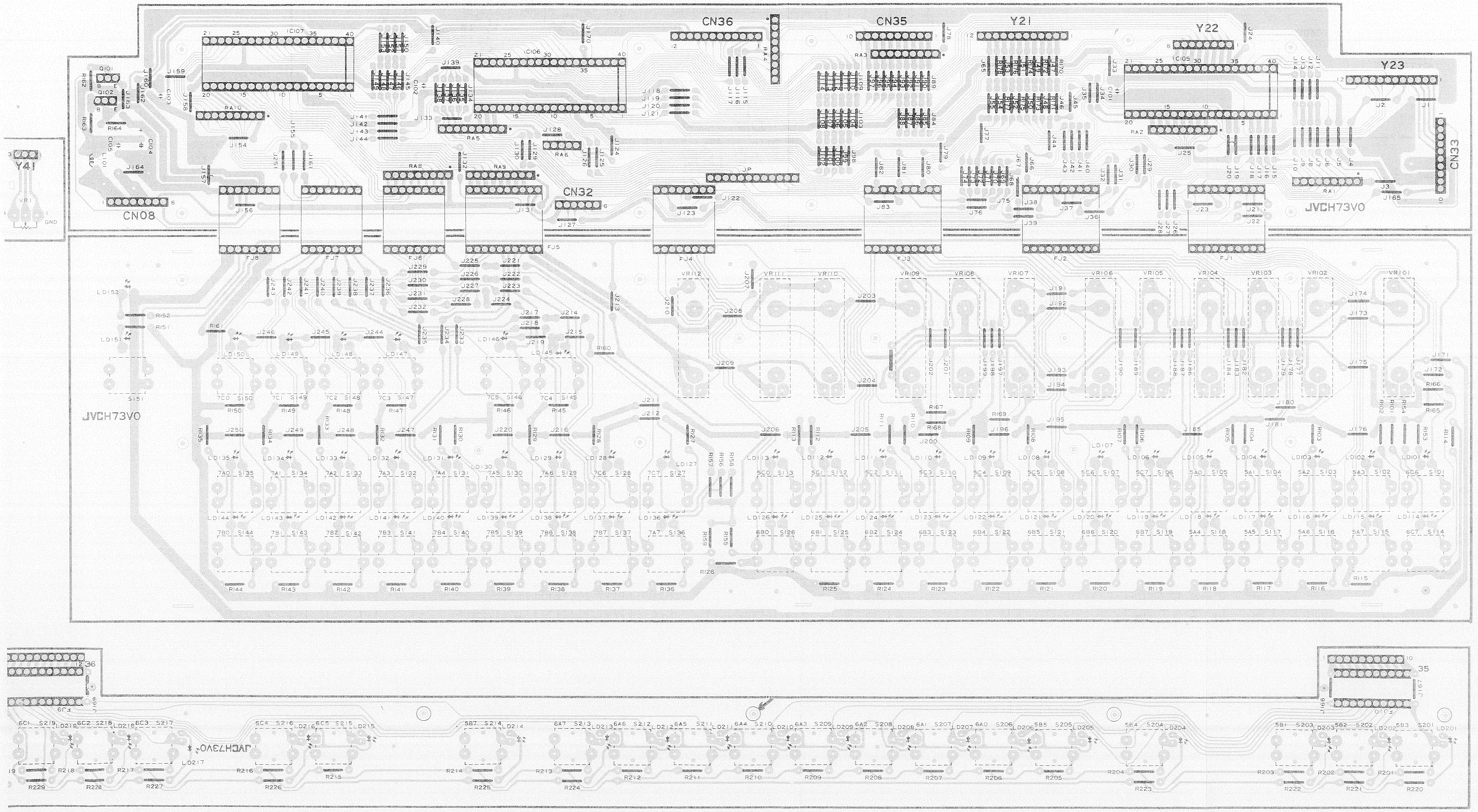

CN42
CN34
CN40
CN41
CN33
GND
+5V
IC1
IC2
IC3
IC4
IC8
C1
C2
C3
C4
Q4
Q5
Q6
Q7
RA1
RA2
RA3
RA4
RA5
RA6
RA7
RA8
RA9
RA10
FJ1 10
FJ2 10
FJ3 10
FJ4
FJ6 6
FJ7 10
FJ8 10
FJ9 10
FJ10 10
WR
D0
D1
D2
D3
D4
D5
D6
D7
RD
A1
A2
LD1
LD72
LD73
LD74


GND
IC2
IC1
IC8
Q6
Q5
Q2
Q38
RA1
RA2
RA3
RA4
FJ3
FJ2
FJ1
LD72
LD73
LD74
+5V

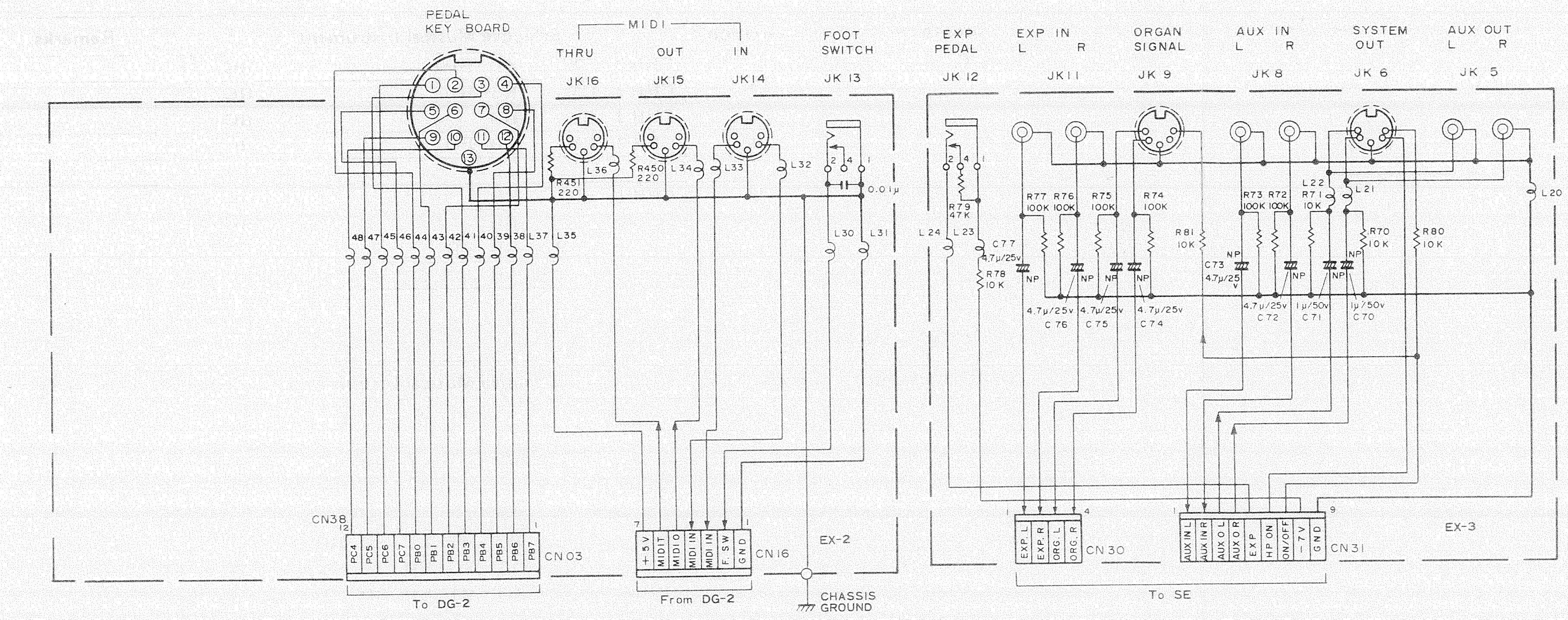
■ CP-R P.C. Board

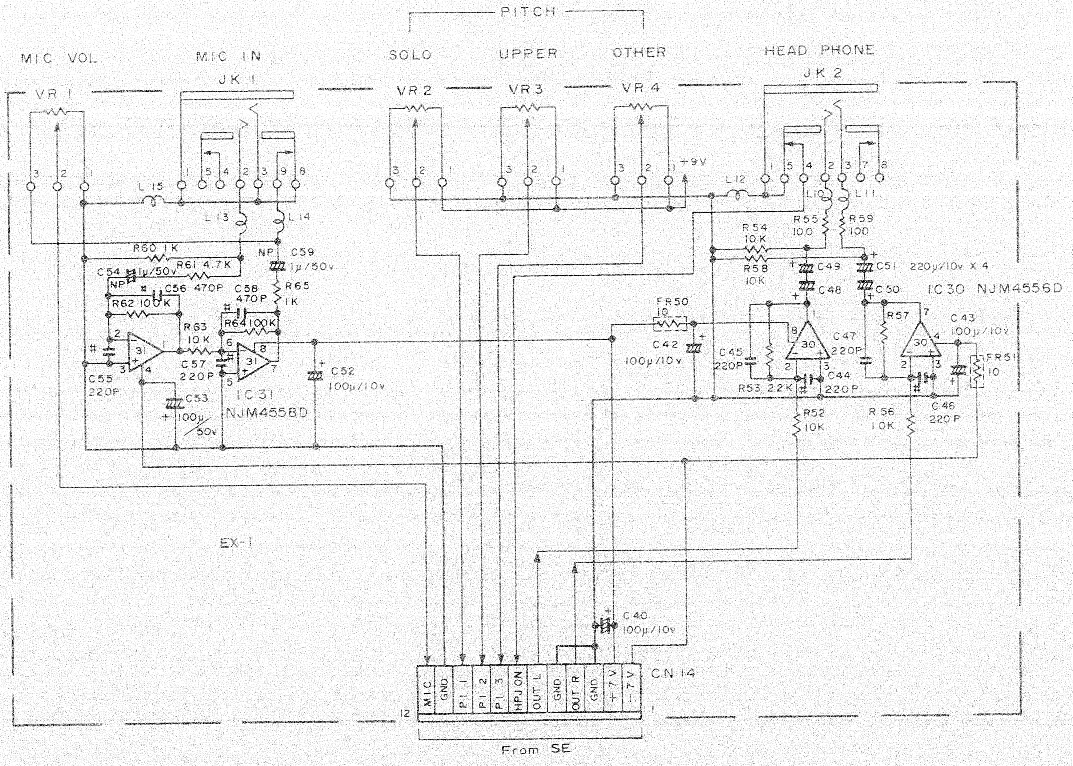

IC107
IC106
CN36
CN32
CN08
Y41
VR1
GND
Q101
Q102
RA4
RA5
RA6
RA8
RA9
RA10
FJ8
FJ7
FJ6
FJ5
FJ4
VR112
JVCH73V0
CN36
FJ9

■ CP-R P.C. Board


CN36
CN35
Y21
Y22
Y23
CN33
CN32
CN08
Y41
VR1
GND
IC107
IC106
IC105
RA1
RA2
RA3
RA4
RA5
RA6
RA8
RA9
RA10
Q101
Q102
JP
FJ1
FJ2
FJ3
FJ4
FJ5
FJ6
FJ7
FJ8
VR101
VR102
VR103
VR104
VR105
VR106
VR107
VR108
VR109
VR110
VR111
VR112
JVCH73V0
36
35

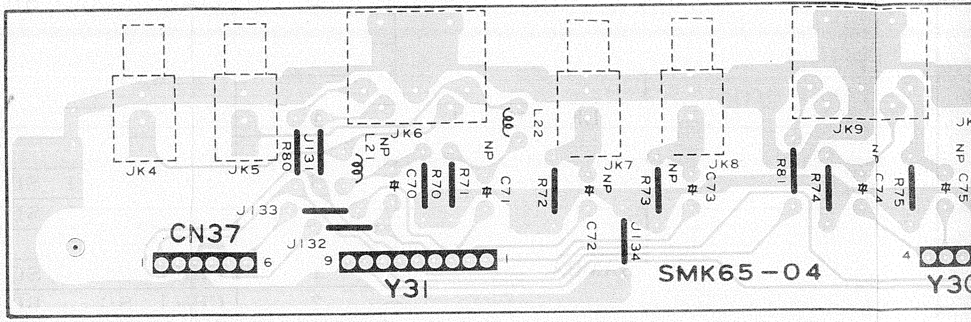
EX-1, EX-2, EX-3 P.C. Board


PEDAL KEY BOARD
MIDI
THRU
OUT
IN
FOOT SWITCH
EXP PEDAL
EXP IN L R
ORGAN SIGNAL
AUX IN L R
SYSTEM OUT
AUX OUT L R
JK16
JK15
JK14
JK 13
JK 12
JK11
JK 9
JK 8
JK 6
JK 5
R451 220
R450 220
0.01μ
R79 47K
R78 10K
C77 4.7μ/25v
R77 100K
R76 100K
R75 100K
R74 100K
R81 10K
R73 100K
R72 100K
R71 10K
R70 10K
R80 10K
C76
C75
C74
C73 4.7μ/25
C72
C71
C70
NP
CN38
CN03
To DG-2
CN16
From DG-2
EX-2
CHASSIS GROUND
CN30
CN31
To SE
EX-3
PC4
PC5
PC6
PC7
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
+5V
MIDI T
MIDI O
MIDI IN
MIDI IN
F.SW
GND
EXP L
EXP R
ORG L
ORG R
AUX IN L
AUX IN R
AUX O L
AUX O R
EXP
HP ON
ON/OFF
-7V
GND

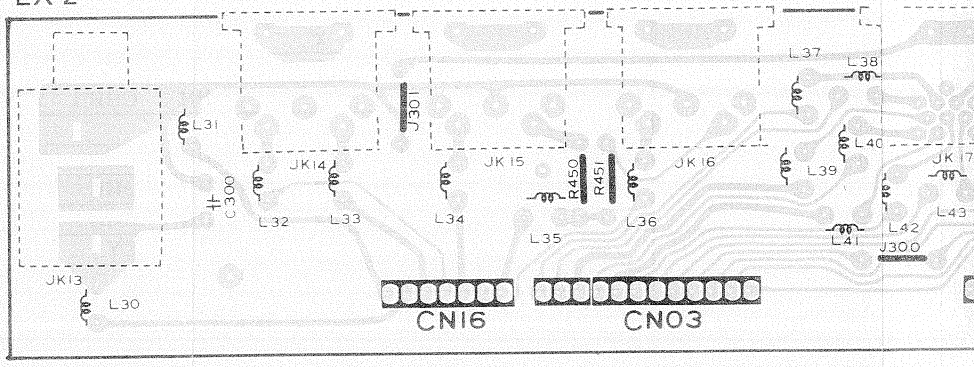

MIC VOL.
MIC IN
JK 1
PITCH
SOLO
UPPER
OTHER
HEAD PHONE
JK 2
VR 1
VR 2
VR 3
VR 4
+9V
L15
L13
L14
L12
L10
L11
R60 1K
R61 4.7K
R62 100K
R63 10K
R64 100K
R65 1K
C54 1μ/50v
C56 470P
C58 470P
C59 1μ/50v
C55 220P
C57 220P
C53 100μ/50v
C52 100μ/10v
IC31 NJM4558D
FR50 10
C42 100μ/10v
C45 220P
R53 22K
C44 220P
C47 220P
R54 10K
R55 100
R59 100
R58 10K
C49
C48
C51 220μ/10v x 4
C50
IC30 NJM4556D
R57
C43 100μ/10v
FR51 10
R52 10K
R56 10K
C46 220P
C40 100μ/10v
EX-1
CN14
From SE
MIC
GND
P1 1
P1 2
P1 3
HPJ ON
OUT L
GND
OUT R
GND
+7V
-7V

Note:
IC30 NJM4556D
IC31 NJM4558DD

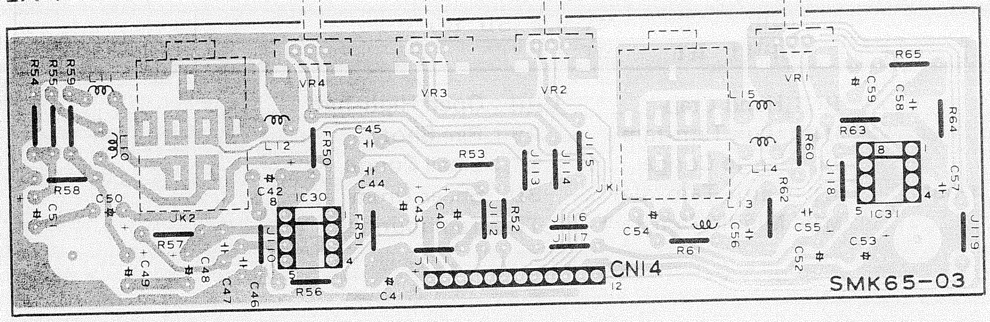
EX-3


JK4
JK5
JK6
JK7
JK8
JK9
CN37
Y31
Y30
SMK65-04
J133
J132
J131
J134
R80
R70
R71
R72
R73
R74
R75
R8
C70
C71
C72
C73
C74
C75
L21
L22
NP

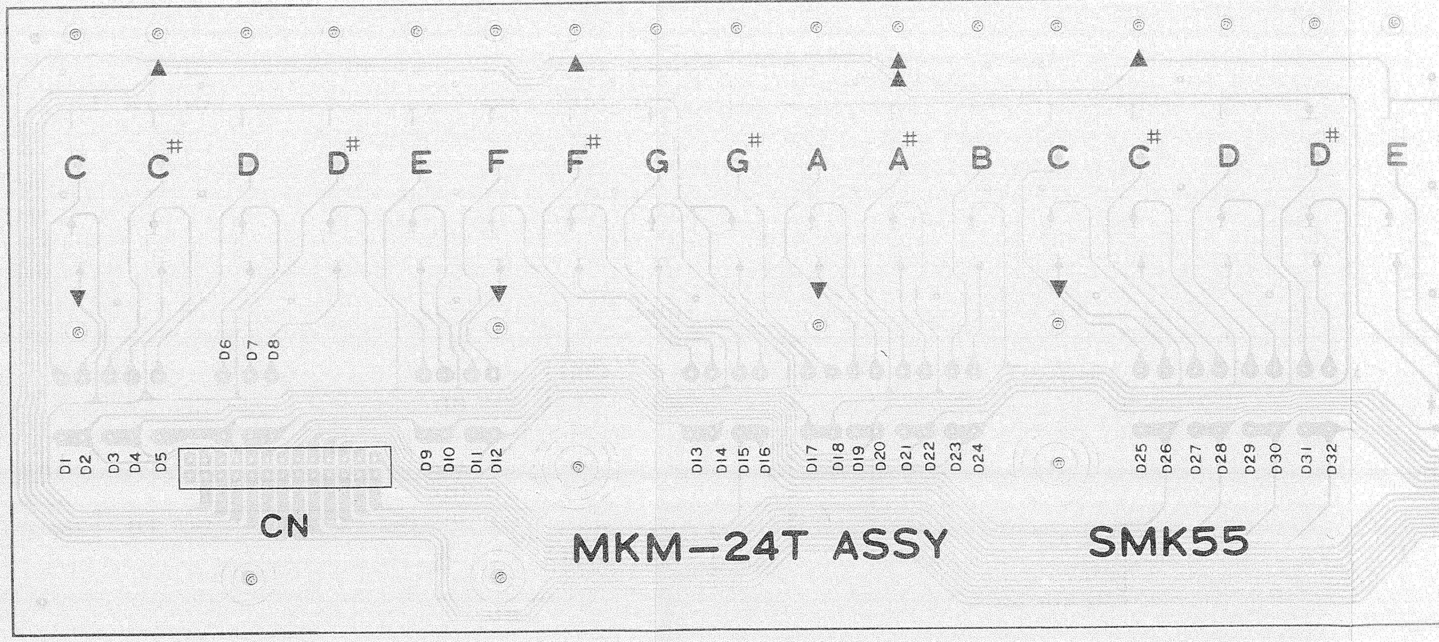
EX-2

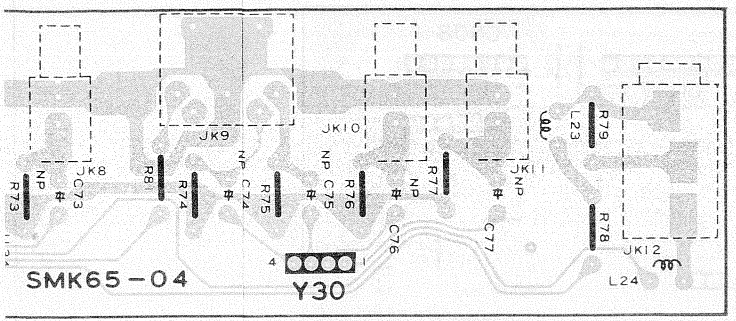

JK13
JK14
JK15
JK16
L30
L31
L32
L33
L34
L35
L36
L37
L38
L39
L40
L41
L42
L43
C300
J300
J301
R450
R451
CN16
CN03

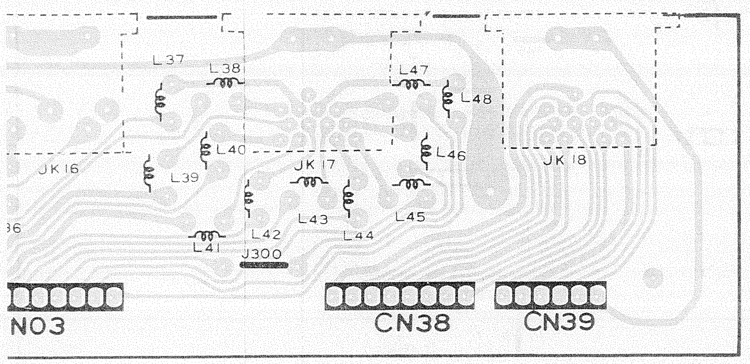
EX-1


VR4
VR3
VR2
VR1
JK2
JK1
IC30
IC31
CN14
SMK65-03
R52
R53
R54
R55
R56
R57
R58
R59
R60
R61
R62
R63
R64
R65
FR50
FR51
C40
C41
C42
C43
C44
C45
C46
C47
C48
C49
C50
C51
C52
C53
C54
C55
C56
C57
C58
C59

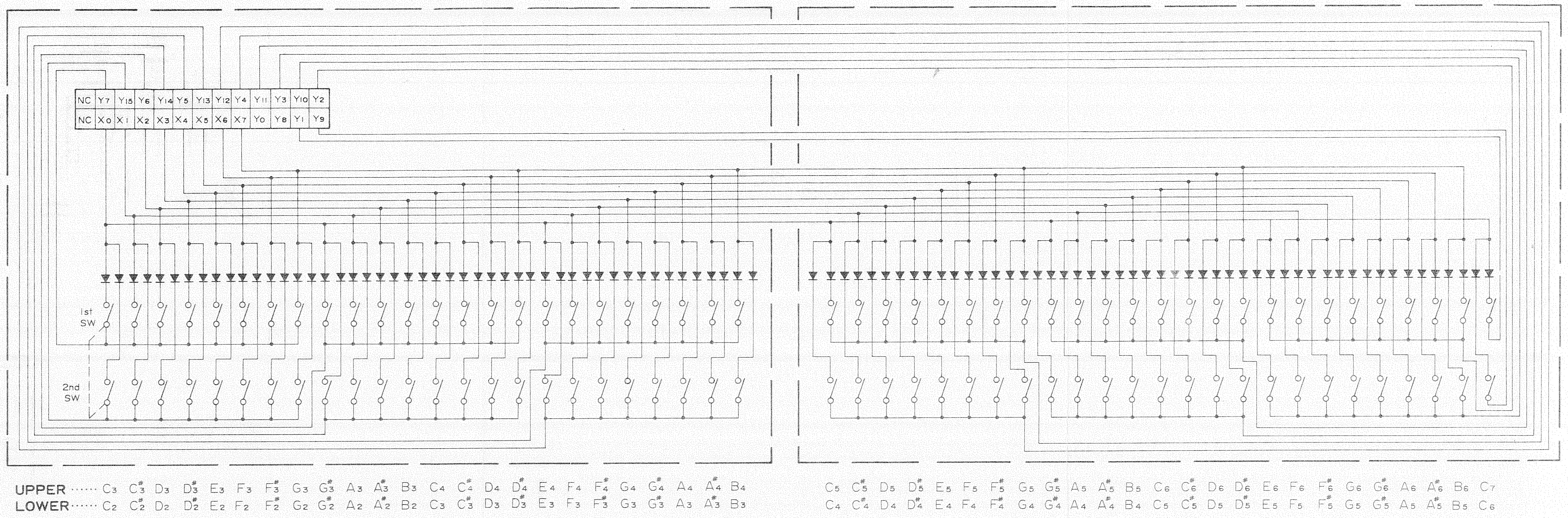
Manual Key

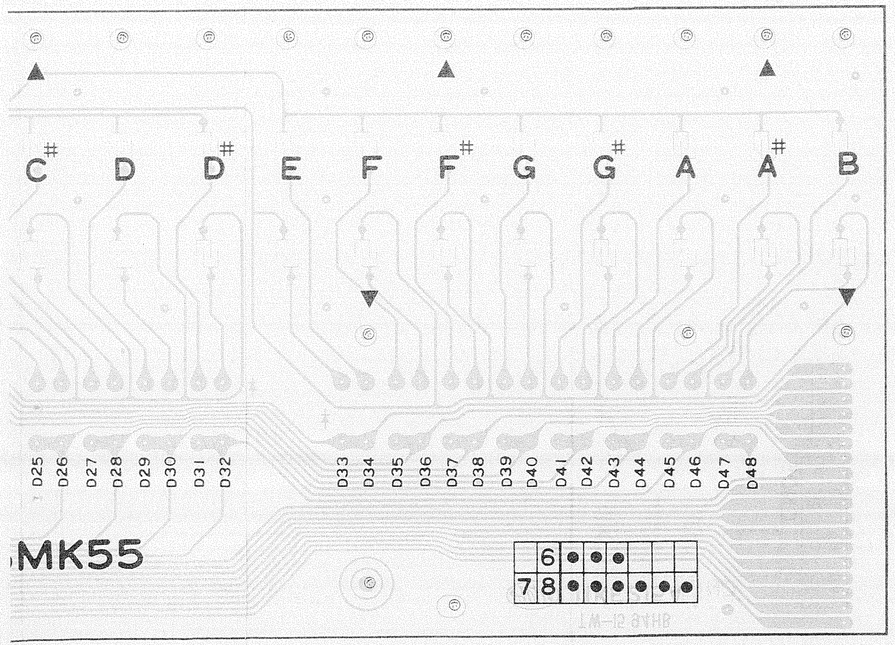

C
C#
D
D#
E
F
F#
G
G#
A
A#
B
C
C#
D
D#
E
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
D13
D14
D15
D16
D17
D18
D19
D20
D21
D22
D23
D24
D25
D26
D27
D28
D29
D30
D31
D32
CN
MKM-24T ASSY
SMK55

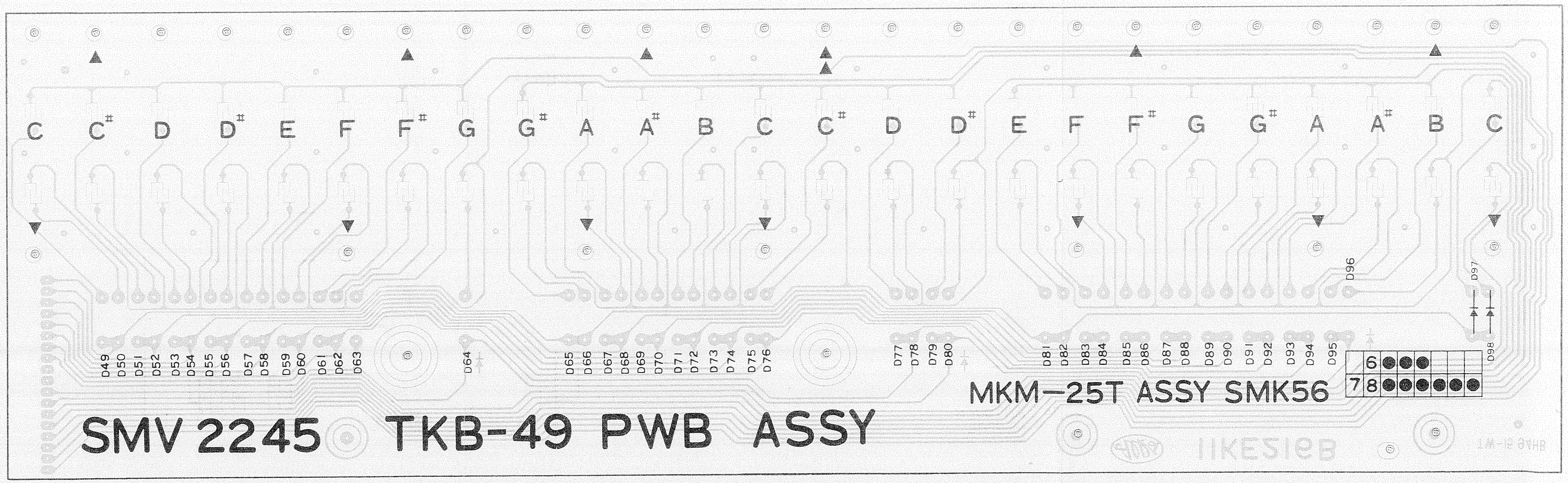

JK8
JK9
JK10
JK11
JK12
R73
R74
R75
R76
R77
R78
R79
R81
C73
C74
C75
C76
C77
L23
L24
NP
SMK65-04
Y30


L37
L38
L39
L40
L41
L42
L43
L44
L45
L46
L47
L48
JK16
JK17
JK18
J300
N03
CN38
CN39

■ Manual Key P.C. Board


NC Y7 Y15 Y6 Y14 Y5 Y13 Y12 Y4 Y11 Y3 Y10 Y2
NC X0 X1 X2 X3 X4 X5 X6 X7 Y0 Y8 Y1 Y9
1st SW
2nd SW
UPPER …… C3 C♯3 D3 D♯3 E3 F3 F♯3 G3 G♯3 A3 A♯3 B3 C4 C♯4 D4 D♯4 E4 F4 F♯4 G4 G♯4 A4 A♯4 B4 C5 C♯5 D5 D♯5 E5 F5 F♯5 G5 G♯5 A5 A♯5 B5 C6 C♯6 D6 D♯6 E6 F6 F♯6 G6 G♯6 A6 A♯6 B6 C7
LOWER …… C2 C♯2 D2 D♯2 E2 F2 F♯2 G2 G♯2 A2 A♯2 B2 C3 C♯3 D3 D♯3 E3 F3 F♯3 G3 G♯3 A3 A♯3 B3 C4 C♯4 D4 D♯4 E4 F4 F♯4 G4 G♯4 A4 A♯4 B4 C5 C♯5 D5 D♯5 E5 F5 F♯5 G5 G♯5 A5 A♯5 B5 C6


C♯ D D♯ E F F♯ G G♯ A A♯ B
D25 D26 D27 D28 D29 D30 D31 D32
D33 D34 D35 D36 D37 D38 D39 D40 D41 D42 D43 D44 D45 D46 D47 D48
MK55
6
78


C C♯ D D♯ E F F♯ G G♯ A A♯ B C C♯ D D♯ E F F♯ G G♯ A A♯ B C
D49 D50 D51 D52 D53 D54 D55 D56 D57 D58 D59 D60 D61 D62 D63 D64
D65 D66 D67 D68 D69 D70 D71 D72 D73 D74 D75 D76
D77 D78 D79 D80
D81 D82 D83 D84 D85 D86 D87 D88 D89 D90 D91 D92 D93 D94 D95 D96 D97 D98
MKM-25T ASSY SMK56
6
78
SMV 2245 TKB-49 PWB ASSY

Parts List by Kind

Kind	⚠	Parts No.	Parts Name	Description	Q'ty
IC		ADC0809CCN	IC	AD Converter	1
		AN7805R	″	Regulator	3
		BA6110	″	Op. Amp.	35
		BA6251	″	Inverter	1
		HA17408P	″	D-A Converter	1
		HD63B03XP	″	MPU	4
		HD74HC154P	″	4-16 Decoder	2
		HD74C273P	″	D Flip Flop	1
		LR74HC244	″	Bus Buffer	3
		LR74HC138	″	3-8 Decoder	3
		LR74HC245	″	Bus Buffer	1
		LR74HC74	″	D Flip Flop	2
		LR74HC32	″	OR Gate	3
		M5230L	″	Regulator	1
		MN3101	″	BBD Clock OSC	1
		MN3102	″	″	3
		MN3204	″	BBD (512-stage)	3
		MN3011	″	BBD	1
		NJM4556D	″	Op. Amp.	1
		NJM4558DD	″	″	28
		NJM082D	″	″	28
		NE571	″	Compounder	1
		PC900	″	Photo Coupler	1
		TC4013BP	″	Flip Flop	1
		TC4049BP	″	Inverter	2
		TC4050BP	″	Buffer	4
		TC4051BP	″	8 CH Switch	6
		TC4053BP	″	2 CH Switch	2
		TC4066BP	″	Quad Switch	1
		TC4069UBP	″	Inverter	2
		TC5012BP	″	Buffer	2
		TC5517APL	″	RAM	5
		TC74HC00P	″	NAND Gate	5
		TC74HC02P	″	NOR Gate	4
		TC74HC04P	″	Inverter	3
		TC74HC08P	″	AND Gate	1
		TC74HC10P	″	″	2
		TC74HC11P	″	″	1
		TC74HC21P	″	″	1
		UPD8255AC-2	″	I/O Port	10
		VC1032-09	″	Filter	1
		″ -04	″	″	2
		″ -11	″	″	3
		VC1036-01	″		1
		VC1040B	″	PFD	6
		VC1041	″	4 CH Sec.	4
		VC1042	″	Level Holder	4
		M1017V	″	MBM2764-25Z (ROM)	2
		M1018V	″	″ -25Z (″)	1
		M1019V	″	HN27256G-25(ROM)	1
Transistor		2SA929(F)	Transistor		50
		2SA684(R)	″		2
		2SB943(P,Q)	″		1
		2SC1570NP(F)	″		34
		2SD1268(P,Q)	″		1

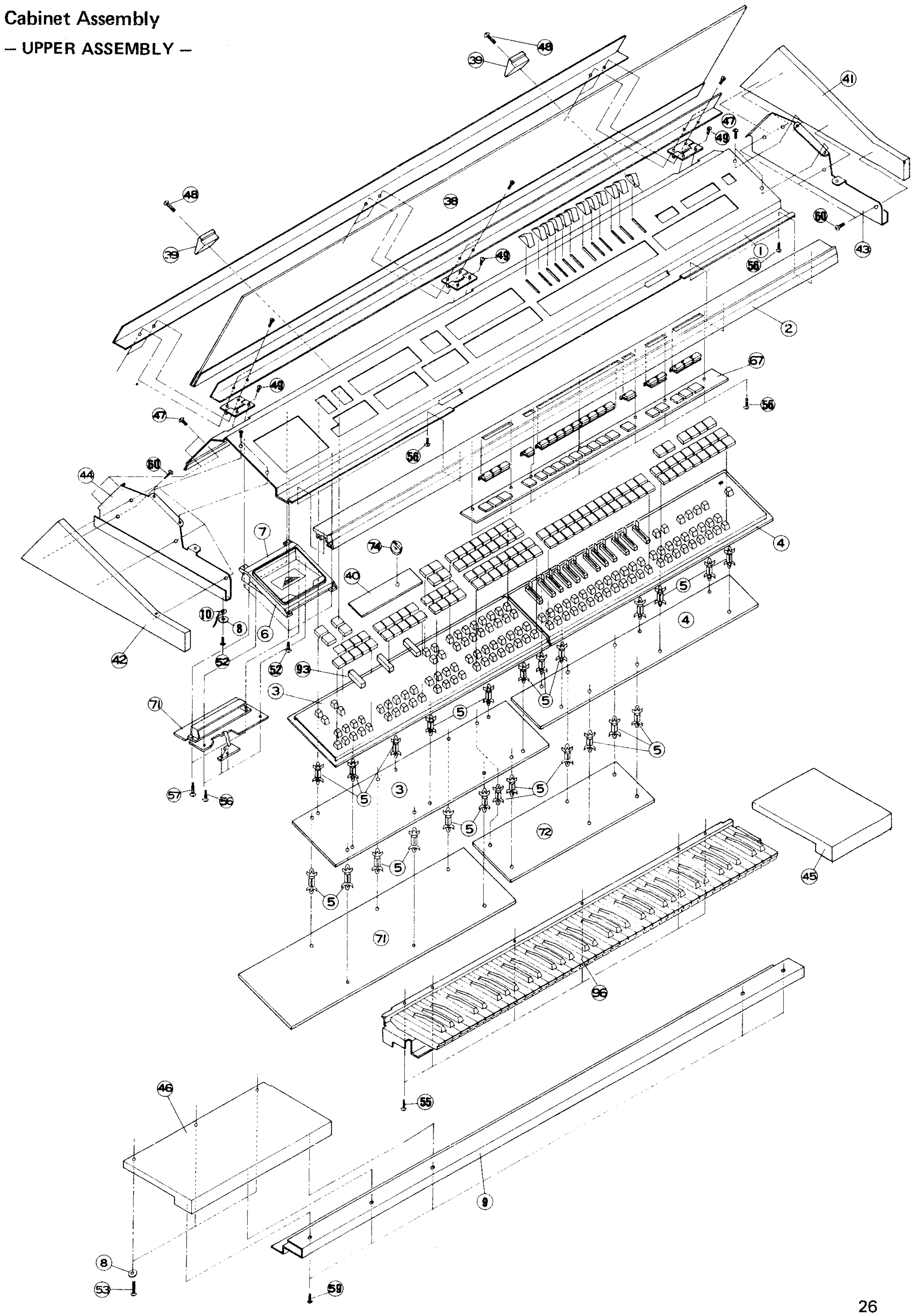
Kind	⚠	Parts No.	Parts Name	Description	Q'ty
Transistor		2SC3069	Transistor		1
		PT431F	Photo Transistor		1
		DTC114N	Transistor		5
		DTA114N	"		3
		2SK163(MN)	F.E.T.		8
Diode		1S1555	Diode		57
		GZA6.2(Y)	Zener Diode		1
		GZA5.1(Y)	"		1
		GZA3.9(Y)	"		1
		GZA3.3(Y)	"		1
		DBA40C-K15	"		1
		DBA20C-K15	"		1
		1SV134-03	Vari. Cap.		1
LED		LB203YB	LED		1
		LD603YY	"		2
		SLR54MC3F	"		3
		SLR54VC3F	"		68
		SLR34VC3F	"		19
		GL430	"		1
		CSA8.00MT	Cera. Lock		2
		CSA1.000MK	"		1
Coil		SMV2110	Osc. Coil		3
		SMV2223	Coil		32
		SMV2224-BS	"		1
Resistor Network		QRB081K-103	Resistor Network		24
		" -223	"		2
		" -103	"		4
		RMNZ4110	"		30
		EXF-P810MW	"		3
Volume		SMV2259	V. Resistor		1
		SMV2189	"		1
		SMV2216	"		3
		QVP8A0B-014	"		24
		" -024	"		4
		" -053	"		1
		" -054	"		24
		SMV2258	S. Volume		12
Switch		SMV2237	M. Switch		1
		SMV2260	P. Switch		51
		SJV0104	T. Switch		19
Jack		QMS6303-015	EXP. Jack		2
		QMS6312-018	HP. Jack		2
		SMV2191	DIN Jack		5
		T5900-ABBA	2-P Jack		3
Fuse Resistor		QRZ0052-100	Fuse Resistor		14
		E48965-002	Fuse Holder		8
		SMV2152	Heat Sink		2
Connector		SS30644-003	Post Header		1
		" -004	"		7
		" -006	"		6
		" -007	"		2
		" -008	"		8
		" -009	"		1
		" -010	"		4
		" -012	"		14

Kind	⚠	Parts No.	Parts Name	Description	Q'ty
Connector		SS30662-006	L. Post Header		1
		" -008	"		2
		" -010	"		2
		" -012	"		3
		SS30810-003	"		1
		SMV2204-FMV	Cassette Connector		1
		SMV2251	13-P Connector		1
		SM30073-026	Connector		2
Socket		SSV0411	IC Socket		3
	⚠	QMC0262-006	AC Socket		1
P.C.B. Ass'y		SMK64-01	SY-2 PCB Ass'y		1
		SMK62	SE PCB Ass'y		1
		SMK63	SY-1 PCB Ass'y		1
		SMK64-02-A	EX-3 PCB Ass'y		1
		SMK65-01	DG-1 PCB Ass'y		1
		" -02	PS-2 PCB Ass'y		1
		" -03	EX-1 PCB Ass'y		1
		" -04	EX-2 PCB Ass'y		1
		SMK66-01	DG-2 PCB Ass'y		1
		" -02	DG-3 PCB Ass'y		1
		" -03-B	PS-1 PCB Ass'y		1
		SMK67	CP-L PCB Ass'y		1
		SMK68-01	CP-R PCB Ass'y		1
		" -02	CP-C PCB Ass'y		1
		SMK55	MKM PCB Ass'y	Lower 24 Keys	2
		SMK56	"	Upper 25 Keys	2
Fuse	⚠	QMF51A2-R50	Fuse		1
	⚠	" -R25	"		1
	⚠	" -1R0	"		1
	⚠	QMF51E2-R50BS	"		2
	⚠	" -R25BS	"		1
	⚠	" -R25BS	"		1
	⚠	" -2R0-BS	"		1
	⚠	" -1R0-BS	"		2

Parts List

■ Cabinet Assembly

– UPPER ASSEMBLY –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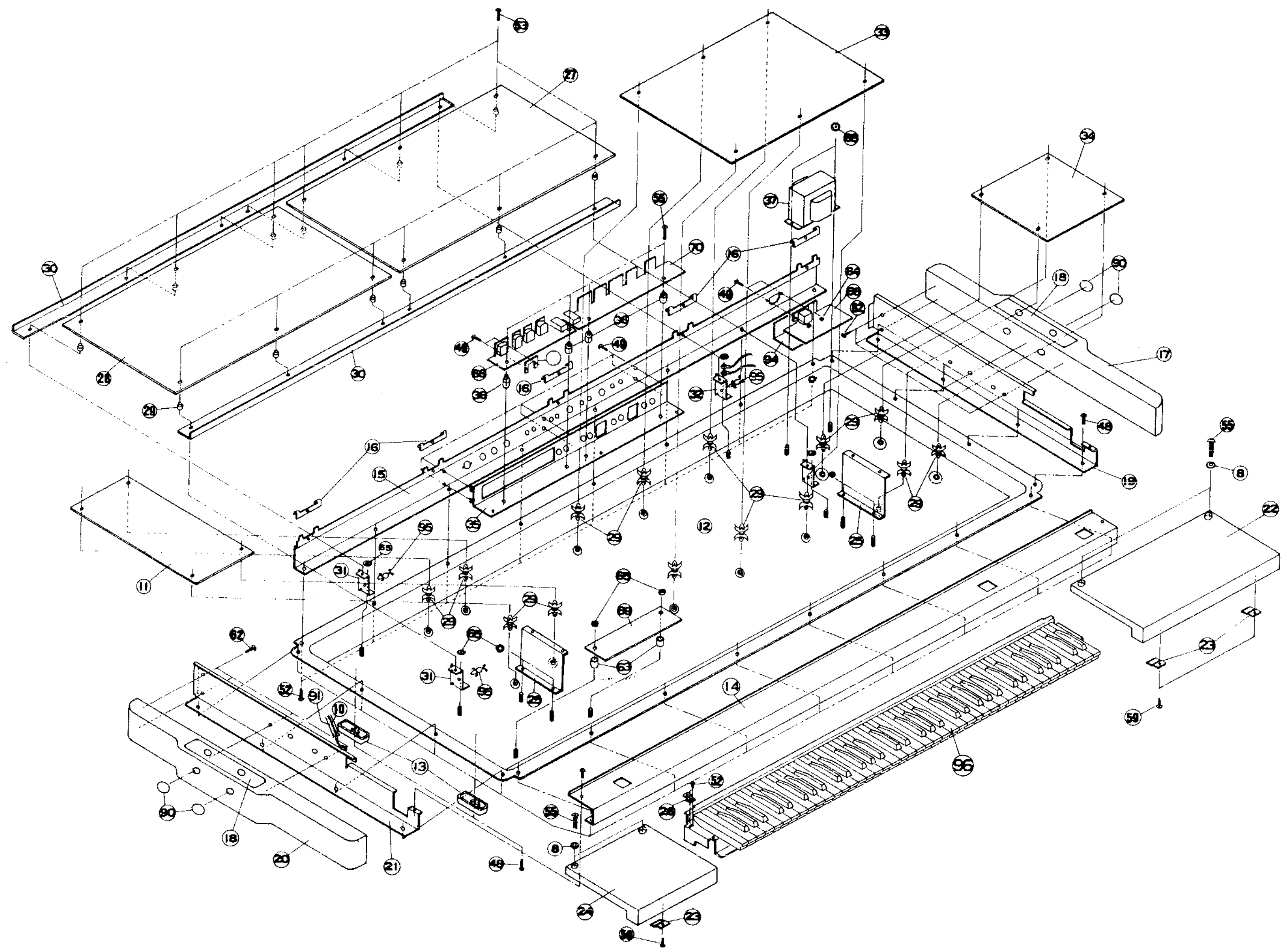
– LOWER ASSEMBLY –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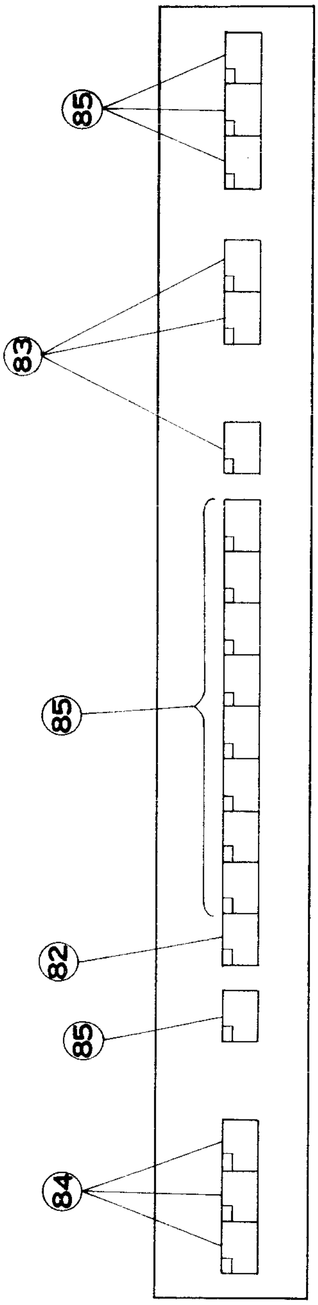
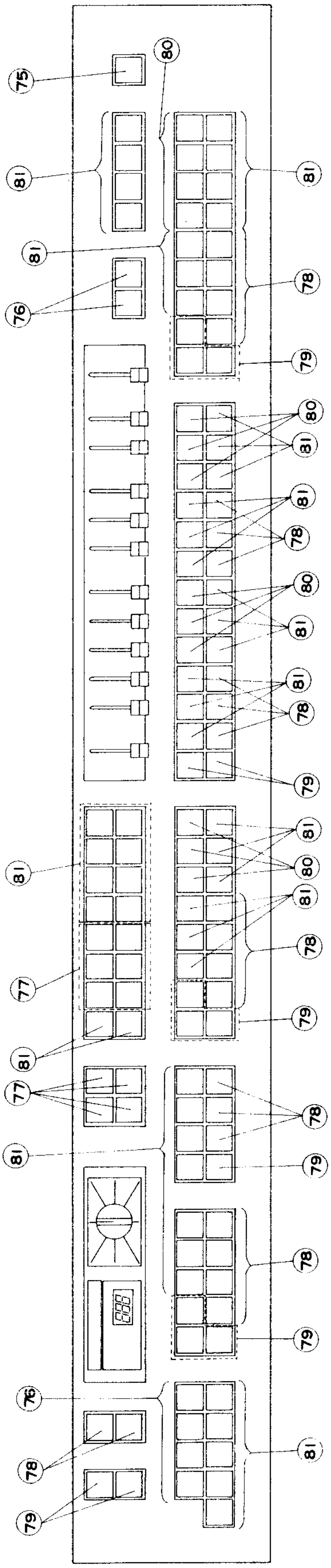
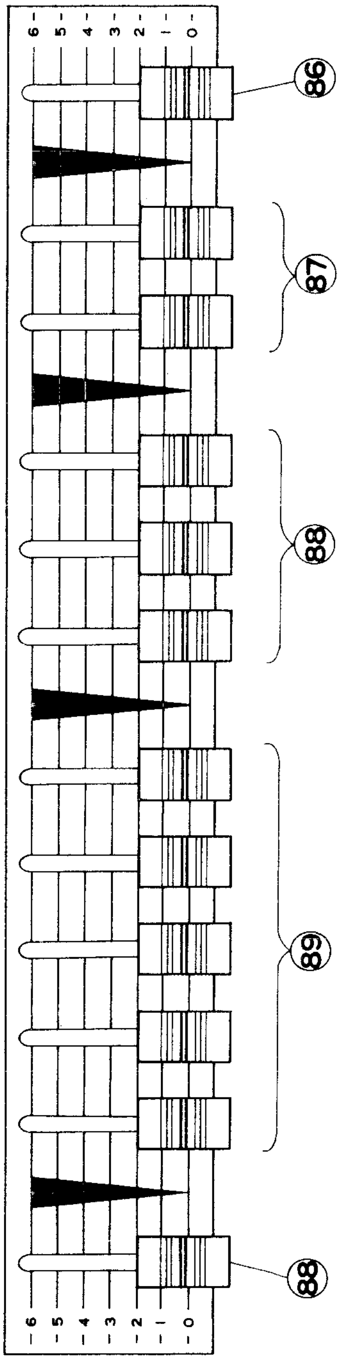
■ Knob Parts





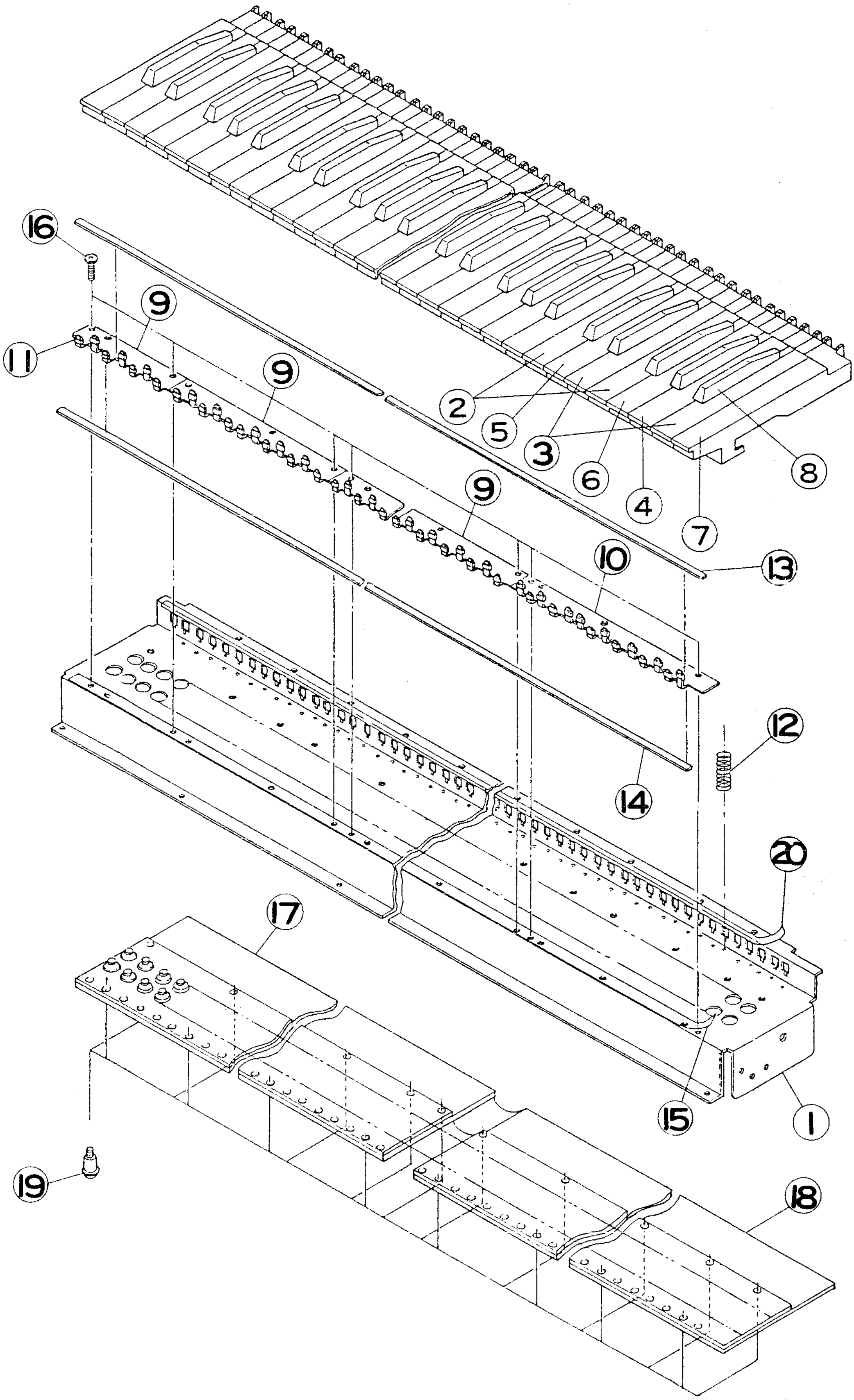


- **Cabinet Assembly Parts List**

No.	⚠	Parts No.	Parts Name	Description	Q'ty
1		SM1430-00B	Control Panel		1
2		SM2843-002	Fitting Ass'y		1
3		SMK67	CP-L PCB Ass'y		1
4		SMK68-01	CP-R PCB Ass'y		1
5		SM40463-002	P. Space		23
6		SM2826	Pack Holder		1
7		SM40474	Cartridge Plate		1
8		Q03091-105	Washer		8
9		SM2829-002	Key Panel		1
10		SM40556	Cramp Wire		1
11		SMK-65-01	DG-1 PCB Ass'y		1
12		SM1431	Botton Cover		1
13		SM40513	Foot		1
14		SM2830-00B	Front Panel		4
15		SM2842-002	Back Panel		1
16		SM40496	Roller Bushing		5
17		SM1424-00R	L. Side Panel - R		1
18		SM40497	Decoration Plate		2
19		SM1425-00R	L. Side Bracket - R		1
20		SM1424-00L	L. Side Panel - L		1
21		SM1425-00L	L. Side Bracket - L		1
22		SM30068-00R	L. Panel - R		1
23		SM40498	Panel Hook Bracket		3
24		SM30060-00L	L. Panel - L		1
25		SM40499	Manual Key Stand		2
26		SM40500	L. Panel Holder		2
27		SMK63	SY-1 PCB Ass'y		1
28		SMK64-01	SY-2 PCB Ass'y		1
29		SM40302-305	Bushing		26
30		SM30074	SY. PCB Holder		2
31		SM40518-00L	SY. PCB Bracket		2
32		″ -00R	″		2
33		SMK62	SE. PCB Ass'y		1
34		SMK65-02	PS-2 PCB Ass'y		1
35		SM2844	EXT. Sub Panel		1
36		SM40302-310	Bushing		4
37	⚠	SMV2257-BS	Power Transformer		1
38		SM2832-00A	Smoked Cover Ass'y		1
39		SM30061	Stopper		2
40		SM30072	Control Plate		1
41		SM2827-00R	Upper Side Panel - R		1
42		″ -00L	″ - L		1
43		SM2828-00R	Upper Side Bracket - L		1
44		″ -00L	″ - R		1
45		SM30067-01R	Upper Panel - R		1
46		SM30055-01L	″ - L		1
47		SDST3008M	Screw		20
48		SPSP3008M	″		4
49		SDST3008M	″		6
50		SPSP4010M	″		9
51		SBST3006Z	Tapping Screw		6
52		SBST3008Z	″		34
53		SBST3016Z	″		16
54		SBST3025Z	″		14
55		SBST3020Z	″		4

No.	⚠	Parts No.	Parts Name	Description	Q'ty
56		SBSF3008Z	Tapping Screw		2
57		SBSF3012M	"		6
58		SSST3008M	"		6
59		MRSP3110Z	Wood Screw		17
60		DPSP3008M	Ass'y Screw		6
61		DPSP4010Z	"		3
62		MRSP3116Z	Wood Screw		8
63		SM40031-001	Space		8
64		NNZ3000Z	Nut		4
65		NGS4000Z	"		10
66		SMK66-03-B	PS-1 PCB Ass'y		1
67		SMK68-2	CP-C PCB Ass'y		1
68		SMK64-02-B	EX-3 PCB Ass'y		1
69		SMK65-03	EX-1 PCB Ass'y		1
70		" -04	EX-2 PCB Ass'y		1
71		SMK66-01	DG-2 PCB Ass'y		1
72		" -02	DG-3 PCB Ass'y		1
73		SM40303	LED		1
74		SS42999	Knob		1
75		SM30069-RED	Push Knob	Refer to Page 27.	1
76		" -BLU	"		6
77		" -VIO	"		10
78		" -GRY	"		13
79		" -DGN	"		14
80		" -GRN	"		23
81		" -WHT	"		51
82		SM30070-RED	Push Knob		1
83		" -BLU	"		3
84		" -VIO	"		3
85		" -SLV	"		12
86		SM30071-RED	Slide Knob		1
87		" -GRN	"		2
88		" -BLU	"		4
89		" -WHT	"		5
90		SM40574	Seal		4
91		QXT641H-400	Tube		1
92		WBS3000N	T. Lock Washer		1
93		SM40552	Spacer		3
94		SM30085	Spacer Insulator		1
95		QHW2115-001	Wire Crump		3
96		OLSM2261	Manual Key		2

■ MANUAL KEY ASSEMBLY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• Manual Key Assembly Parts List

No.	⚠	Parts No.	Parts Name	Description	Q'ty
1		SM2733-49T	MK Chassis		1
2		SM2821-WCF	White Key	C (do), F (fa)	8
3		" -WEB	"	E (mi), B (si [ti])	8
4		" -WOA	"	A (la)	4
5		" -WOD	"	D (re)	4
6		" -WOG	"	G (so)	4
7		" -WCC	"	C (do) in the Highest Octave	1
8		SM30045-WBL	Black Key		20
9		SM3861-212	Key Guide		3
10		" -213	"		1
11		SM40205-002	Guide Rubber		49
12		SM40490	Key Spring		49
13		SM4990-067-GAS	Felt		1
14		" -067-GVS	"		1
15		HRT010-999	Double-sided Adhesive Tape		1
16		SBST3008Z	T. Screw		12
17		SMK55	MKM Board	Left	1
18		SMK56	"	Right	1
19		SM40296	Screw		26
20		SM40213-003	Tape		1

• DG-1 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK65-01	DG-1 PCB Ass'y		1
IC1		HD63B03XP	IC	CPU	1
IC4, 5		HD74HC154P	"		2
IC7		HD74HC273P	"		1
IC6		LR74HC138	"		1
IC3		M1017-V	"	MBM2764-25 (ROM)	1
IC9, 10		TC4050BP	"		2
IC11, 12		TC5012BP	"		2
IC2		TC5517APL	"		1
IC8		TC74HC02P	"		1
IC2		SSV0411	IC Socket		1
X1		CSA8.00MT	Cera. Lock		1
L1		SMV2223	Coil		1
CA1, 2		EXF-P8101MW	Resistor Network		2
RA1, 2		QRB081K-223	"		2
CN1, 2		SM30073-026	Connector		2
CN12		SS30644-004	Post Header		1
CN25		" -012	"		1
C1, 2		QCS31HJ-100	C. Capacitor		2
C3, 4		QCF31HP-103	"		2
C5		QETC1AM-227	E. Capacitor		1
R1–16		QRD141J-102	C. Resistor		16

● DG-2 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK66-01	DG-2 PCB Ass'y		1
IC1		HD63B03XP	IC		1
IC2		M1019-V	″	HN27256G-25 (ROM)	1
IC10		LR74HC245	″		1
IC11, 12		LR74HC244	″		2
IC12, 14		LR74HC138	″		2
IC21, 30		LR74HC74	″		12
IC22, 25, 28		LR74HC32	″		3
IC37		PC900	″		1
IC4, 5		TC5517APL	″		2
IC31, 32, 36		TC74HC00P	″		3
IC24		TC74HC02P	″		1
IC23, 25		TC74HC04P	″		2
IC29		TC74HC08P	″		1
IC26		TC74HC11P	″		1
IC27		TC74HC21P	″		1
IC33, 34		TC4050BP	″		1
IC6		UPD8255AC-2	″		2
Q10		2SA929(F)	Transistor		1
Q1–9		2SC1570NP(F)	″		9
Q11		2SC3069	″		1
Q12		PT431F	″		1
D1, 3, 4		1S1555	Diode		3
D2		GZA3.3(Y)	Zener Diode		1
IC2		SSV0411	IC Socket		1
X1		CSA1.000MK	Cera. Lock		1
X2		CSA8.00MT	″		1
L1, 2, 3		SMV2223	Coil		3
RA1–23		RMNZ4110	Resistor Network		23
RA24, 25		QRB081K-103	″		2
LD1		GL430	LED		1
S2		SMV2237	M. Switch		1
		SMV2204-FMV	Cassette Connector		1
C14, 15		SMV2209-473	G. Capacitor	Back-up	2
CA1		EXF-P8101MW	Resistor Network		1
CN12, 15, 20		SS30644-004	Post Header		3
CN9		″ -006	″		1
CN16		″ -007	″		1
CN3, 25		″ -012	″		2
CN26		SS30662-008	L. Post Header		1
CN19, 24		″ -012	″		2
FJ4		SCV0526-102	Flex. Jumper		1
FJ5		″ -032	″		1
FJ3		SS43181-043	″		1
FJ1, 2		SS44769-233	″		2
FJ6		″ -021	″		1
C2, 3, 4, 5		QCS31HJ-100	C. Capacitor		4
C6		″ -220	″		1
C7, 8, 16, 18		QCF31HP-103	″		4
C11, 12		QFN31HJ-102	M. Capacitor		2
C13		″ -272	″		1
C1		″ -823	″		1
C17		″ -227	″		1
R		QRD141J-	C. Resistor		46

● DG-3 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK66-02	DG-3 PCB Ass'y		1
IC8		ADC0809CCN	IC		1
IC15		LR74HC-245	"		1
IC16		" -244	"		1
IC19, 20		NJM4558DD	"		2
IC17		TC4066BP	"		1
IC18		TC74HC04P	"		1
IC7		UPD8255AC-2	"		1
D4		1S1555	Diode		1
L1		SMV2223	Coil		1
RA30–33		RMNZ4110	Resistor Network		4
CN17, 18		SS30644-008	Post Header		3
CN13		" -012	"		3
C47–51		QETC1HM-105	E. Capacitor		8
C33		QETC1AM-227	"		1
C40, 41, 42		QEN61HM-105	"		3
C43, 44, 45		QEN61EM-475	"		3
		QCS31HJ-	C. Capacitor		14
		QRD141J-	C. Resistor		49
CN22		SS30662-008	L. Post Header		
CN21, 23		SS30662-012	"		

• SY-1 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK63	SY-1 PCB Ass'y		1
IC3		M1018-V	IC	MBM2764-25 (ROM)	1
IC26–28, 35–39		BA6110	"		12
IC12, 13		HA17408P	"		2
IC1		HD63B03XP	"		1
IC5		LR74HC138	"		1
IC14		NJM082D	"		1
IC19, 29, 30, 40, 44		NJM4558DD	"		5
IC9		TC4049BP	"		1
IC41–43		TC4051BP	"		3
IC11		TC4053BP	"		1
IC10		TC4069UBP	"		1
IC2		TC5517APL	"		1
IC6		TC74HC00P	"		1
IC7		TC74HC02P	"		1
IC8		TC74HC10P	"		1
IC4		UPD8255AC-2	"		1
IC23		VC1036-01	"		1
IC20, 21, 22		VC1040B	"		3
IC24, 25		VC1041	"		2
IC15–18		VC1042	"		4
Q1–9, 16–19		2SA929(F)	Transistor		13
Q10–15, 20		2SC1570NP(F)	"		7
D1–9, 16–18		1S1555	Diode		12
IC3		SSV0411	IC Socket		
L1, 2		SMV2110	Osc. Coil		2
VR219, 229, 239, 249, 259, 269, 279, 289, 299		QVP8A0B-014	V. Resistor		9
VR160, 170, 180, 210, 220, 230, 240, 250, 260, 270, 280, 290		" -054	"		12
D10, 11		1SV134-03	Vari. Capacitor		2
X1		CSA8.00MT	Cera Lock		1
L3, 4, 5		SMV2223	Coil		3
CN28		SS30644-003	Post Header		1
CN15		" -004	"		1
CN17		" -008	"		1
CN10		" -010	"		1
CN27		" -012	"		1
FJ3, 4		SS43181-061	Flex. Jumper		2
FJ2		" -062	"		1
FJ5		" -031	"		1
FJ8		" -032	"		1
FJ1		" -081	"		1
FJ7		" -082	"		1
FJ6		" -121	"		1
		QEN61HM-105	E. Capacitor		35
		QETC1HM-105	"		19
		QETC1EM-475	"		17

- **SY-2 P.C.B. Assembly Parts List**

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK64	SY-2 PCB Ass'y		1
IC3		M1018-V	IC	MBM2764-25 (ROM)	1
IC26–28, 35–39		BA6110	"		12
IC12, 13		HA17408P	"		2
IC1		HD63B03XP	"		1
IC5		LR74HC138	"		1
IC14		NJM082D	"		1
IC19, 29, 30, 40, 44		NJM4558DD	"		5
IC9		TC4049BP	"		1
IC41–43		TC4051BP	"		3
IC11		TC4053BP	"		1
IC10		TC4069UBP	"		1
IC2		TC5517APL	"		1
IC6		TC74HC00P	"		1
IC7		TC74HC02P	"		1
IC8		TC74HC10P	"		1
IC4		UPD8255AC-2	"		1
IC23		VC1036-01	"		1
IC20, 21, 22		VC1040B	"		3
IC24, 25		VC1041	"		2
IC15–18		VC1042	"		4
Q1–9, 16–18		2SA929(F)	Transistor		12
Q10–13, 15, 20		2SC1570NP(F)	"		6
D1–9, 16–18		1S1555	Diode		12
IC3		SSV0411	IC Socket		
L2		SMV2110	Osc. Coil		1
VR219, 229, 239, 249, 259, 269, 279, 289, 299		QVP8A0B-014	V. Resistor		9
VR160, 170, 180, 210, 220, 240, 250, 260, 270, 280, 290		" -054	"		12
D11		1SV134-03	Vari. Capacitor		1
X1		CSA8.00MT	Cera Lock		1
L4, 5		SMV2223	Coil		2
CN28		SS30644-003	Post Header		1
CN15		" -004	"		1
CN17		" -008	"		1
CN10		" -010	"		1
CN27		" -012	"		1
FJ3, 4		SS43181-061	Flex. Jumper		2
FJ2		" -062	"		1
FJ5		" -031	"		1
FJ8		" -032	"		1
FJ1		" -081	"		1
FJ7		" -082	"		1
FJ6		" -121	"		1
C184		QFN31HJ-182ZD	M. Capacitor		1
C185		" -682ZD	"		1
C186, 211–219		" -333ZD	"		10
C1, 3		QCS31HJ-220ZD	C. Capacitor		2
C52, 55		" -330ZK	"		2

• SE P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK62	SE PCB Ass'y		1
		SM81008	SE P.C. Board		1
IC2, 3, 5–7, 27, 34, 37–40		BA6110	IC		11
IC31		MN3101	″		1
IC15, 22, 25		MN3102	″		3
IC14, 21, 24		MN3204	″		3
IC30		MN3011	″		1
IC12		NE571N	″		1
IC1, 4, 8–11, 16, 17, 19, 28, 29, 35, 36, 41, 42		NJM4558DD	″		15
IC18		TC4069UBP	″		1
IC32		VC1032-03	″		1
IC26, 33		″ -04	″		2
IC13, 20, 32		″ -11	″		3
Q2,6–8,10,11,15,21,23,24,26		2SA929(F)	Transistor		10
Q1,3,9,12,14,16,20,27,28,29		2SC1570NP(F)	″		10
Q4,5,13,17–19,22, 25		2SK163(MN)	FET		8
D1–8, 10–26		1S1555	Diode		25
D28		GZA3.9(Y)	Zener Diode		1
D9		GZA5.6(Y)	″		1
VR150,173,215,225,246,302		QVP8A0B-014	V. Resistor		6
VR32, 39, 278, 287		″ -024	″		4
FR1, 2, 65, 66, 133, 143, 157, 158, 229, 230, 299, 300		QRZ0052-100	F. Resistor		12
CN30		SS30644-004	Post Header		1
CN32		″ -006	″		1
CN29		″ -008	″		1
CN31		″ -009	″		1
CN10, 11		″ -010	″		2
CN7, 13, 14, 27		″ -012	″		4
FJ2		SS43181-052	Flex. Jumper		1
FJ1		″ -072	″		1
C80–82		QFV81HJ-824	T.F. Capacitor		3
C52, 146		QFM81HJ-105	M. Capacitor		2
C111		QFN31HJ-	″		35
		QCS31HJ-	C. Capacitor		40
		QETC1AM-227	E. Capacitor		15
		QETC1EM-106	″		11
		QETC1HM-105	″		12
		″ -475	″		4
		QEN61EM-475	″		22
		QRD141J-	C. Resistor		307
D27		GZA2.7(Y)	Zener Diode		1

• CP-L P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK67	CP-L PCB Ass'y		1
IC1–4		UPD8255AC-2	IC		4
IC8		BA6251	"		1
Q7		2SA684(R)	Transistor		1
Q4–6		DTA114N	D. Transistor		3
Q4–6		DTC114N	"		3
LD72		LB203YB	LED		1
		SLR54MC3F	"		3
		SLR54VC3F	"		68
LD73, 74		LD603YY	"		2
VR1		SMV2259	R. Volume		1
SW1–67		SMV2260	Push Switch		67
RA1–3, 4–10		QRB081K-103	Resistor Network		9
RA4		QRB041K-103	"		1
CN40		SS30662-006	L. Post Header		1
CN34		" -008	"		1
CN33		" -010	"		1
FJ5		SS43181-032	Flex. Jumper		1
FJ6		" -062	"		1
FS1–4, 7–9		" -102	"		7
FJ10		" -031	"		1
		QRD141J-	C. Resistor		104
C1–4		QCF31HP-103	C. Capacitor		4
		SM2840	Control Panel - L		1
Q1–3		2SA929(F)	Transistor		3

• CP-R P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK68-01	CP-R PCB Ass'y		1
IC5, 6, 7		UPD8255AC-2	IC		3
Q102		2SA684(R)	Transistor		1
Q101		DTC114N	D. Transistor		1
		SLH-56VR3F	LED		52
RA1–5, 9, 10		QRB081K-103	Resistor Network		8
RA6–8		QRB041K-103	"		3
RA11, 12, 13		RMNZ4110	"		3
VR101–112		SMV2258	S. Volume		12
L101		SMV2223	Coil		1
S101–151		SMV2260	Push Switch		51
CN32		SS30644-006	Post Header		1
CN8		" -006	"		1
CN35		SS30662-010	L. Post Header		1
CN36		" -012	"		1
FJ5–8		SS43181-082	Flex. Jumper		4
FJ1–4		" -102	"		4
		QRD141J-	C. Resistor		55
C101–103		QCF31HP-103	C. Capacitor		3
C104		QETC1AM-107	E. Capacitor		
		SM2841	Control Panel - R		1

● CP-C P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK68-02	CP-C PCB Ass'y		1
		SLR-34VC3F	LED		19
		SJV0104	Tact Switch		19
		SS43181-111	Flex. Jumper		1
		" -101	"		1
R220–229		QRD141J-471SY	C. Resistor		10
R201–219		" -332SY	"		19

• EX-1 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK65-03	EX-1 PCB Ass'y		1
IC30		NJM4556D	IC		1
IC31		NJM4558DD	"		1
L10–15		SMV2223	Coil		6
VR1		SMV2189	V. Resistor		1
VR2–4		SMV2216	"		3
J1, 2		QMS6312-018	H.P. Jack		2
FR50, 51		QRZ0052-100	F. Resistor		2
CN14		SS30644-012	Post Header		1
C55, 57		QCS31HJ-221	C. Capacitor		2
C56, 58		" -471	"		2
C40–43, 52, 53		QETC1AM-107	E. Capacitor		6
C48–51		" -227	"		4
C54, 59		QEN61HM-105	"		2
		QRD141J-	C. Resistor		9

• EX-2 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK65-04	EX-2 PCB Ass'y		1
J12		QMS6303-015	EXP. Jack		1
J6, 9		SMV2191	DIN Jack		2
		T5900-ABBA	2-P Pin Jack		3
L20–24		SMV2223	Coil		5
		QRD141J-	C. Resistor		10
C72–77		QEN61EM-475	E. Capacitor		6

• EX-3 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK64-02-A	EX-3 PCB Ass'y		1
L30–48		SMV2223	Coil		19
J17		SMV2251	13-P Connector		1
J14, 15, 16		SMV2191	DIN Jack		3
J13		QMS6303-015	EXP. Jack		1
CN29		SS30644-006	Post Header		1
CN16		" -007	"		1
CN38		" -008	"		1
CN3		" -012	"		1
R450, 451		QRD141J-101	C. Resistor		2

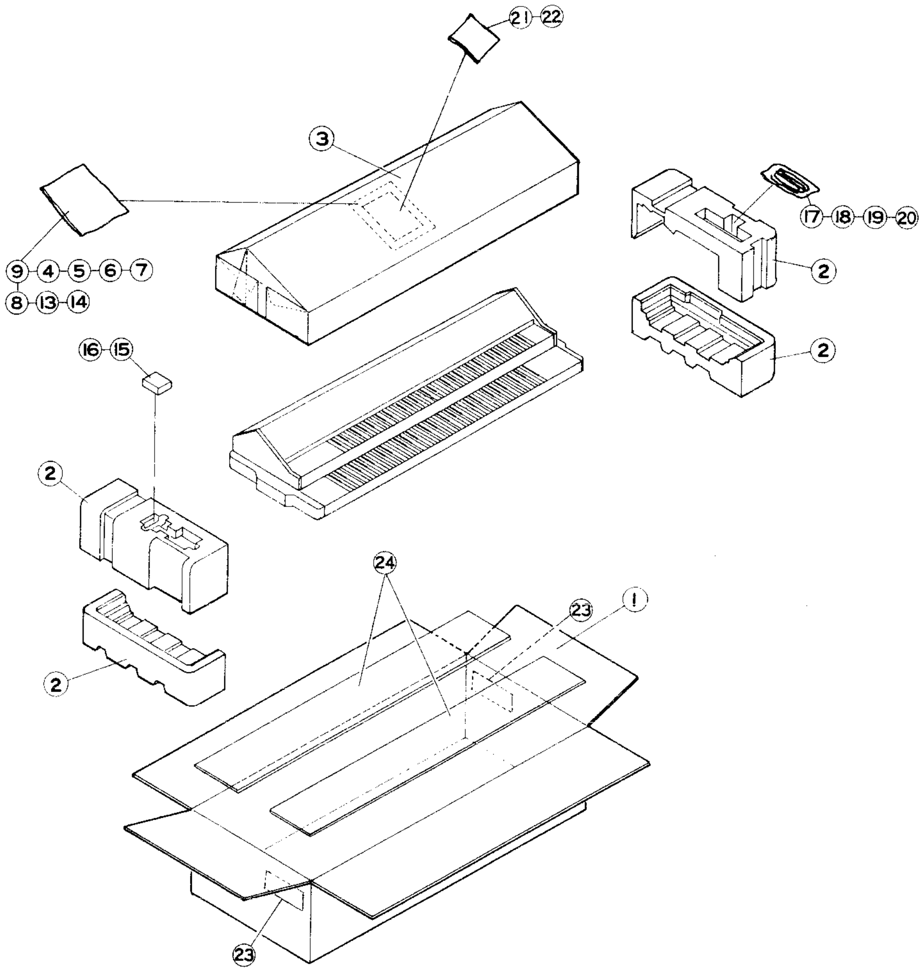
• PS-1 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK-66-03-B	PS-1 PCB Ass'y		1
L10	⚠	SMV2224-BS	Coil		1
F1	⚠	E48965-002	Fuse Holder		2
C100, 101	⚠	QCZ9019-103-BS	C. Capacitor		2
J3	⚠	QMC0263-004-BS	Socket	AC INPUT	1
CN4	⚠	SS30810-004	L. Post Header		1
S1	⚠	QSS2325-103-BS	Slide Switch		1

• PS-2 P.C.B. Assembly Parts List

Symbol No.	⚠	Parts No.	Parts Name	Description	Q'ty
		SMK65-02	PS-2 PCB Ass'y		1
IC22, 23, 24		AN7805R	IC		3
IC21		M5230L	″		1
IC20		TC4013BP	″		1
Q2		2SB943(P,Q)	Transistor		1
Q3, 4		2SC1570NP(F)	″		2
Q1		2SD1268(P,Q)	″		1
D4–7		1S1555	Diode		4
D1		DBA40C-K15	″		1
D2		DBA20C-K15	″		1
		GZA5.1(Y)	Zener Diode		1
VR42		QVP8A0B-053	V. Resistor		1
F3, 4, 5		E48965-002	Fuse Holder		6
		SMV2152	Heat Sink		2
		SMV2261	″		3
CN9		SS30644-006	Post Header		1
CN8		″ -008	″		1
CN7		″ -012	″		1
CN6		SM3490-005	P.M. Pin		1
C10		QEL71CR-688	E. Capacitor		1
C11, 12		QEL71ER-338	″		2
C13–15		QCF32HP-103	C. Capacitor		3
C19, 20		QCS31HJ-221	″		2
C17, 22		QETC1HM-105	E. Capacitor		2
C16, 21, 23–27, 32, 35		QETC1EM-106	″		9
C29		QETC1AM-107	″		1
C18,28,30,31,32,34,36		QFN31HJ-104	M. Capacitor		7
		QRD141J-	C. Resistor		19

Packing



• Packing Parts List

No.	⚠	Parts No.	Parts Name	Description	Q'ty
1		PK-NS-70	Packing Case	Outside] SM1437-00D	1
2		NZ-NS-70	"	Inside	1
3		PKSM100-5	Sheet	1,610 mm x 1,100 mm for Main Unit	1
4		SMA1119	Instruction Book 1	NS-70 Owner's Manual	1
5		SMA1130	" 2	" The Sound Creator Manual	1
6		SMA1101-002	JVC Song Book		1
7		SMA1131	Regist. Chart		1
8		SMA9015	Envelope		1
9		SMA9039	Enquete		1
					1
					1
					1
13		SMV2264	Pin Plug Cable		1
14		QPGA025-03505	Poly Bag		1
15		KE-10	D. Composer		1
16		QPGA017-02505	Poly Bag		1
17	⚠	QMP5168-250-BS	Power Cord	for Model B	1
18	⚠	QMP2550-200	"	for Model H	1
19	⚠	QMP3950-244	"	for Model N/G	1
20		QPGA012-03005	Poly Bag		1
21		BT20060	Guarantee Cert.	] Model B only	1
22		QPGA017-02505	Poly Bag		1
23		SM3921-001	Blank Label		5
24		SM40587	Frame Board		2

JVC

VICTOR COMPANY OF JAPAN, LIMITED.
SPECIAL EQUIPMENT DIVISION

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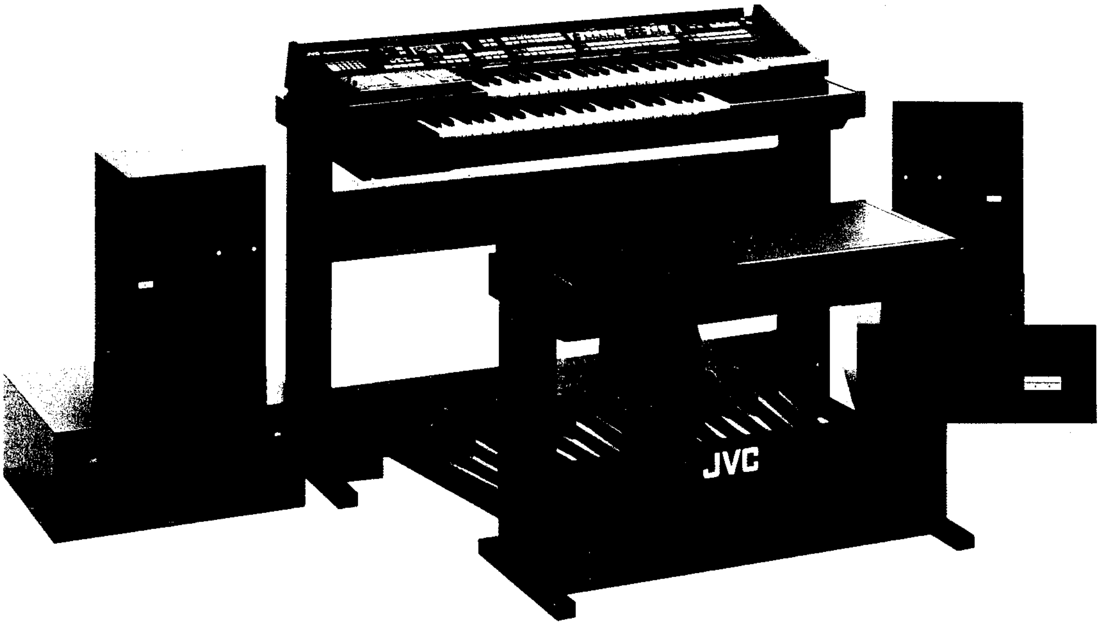
Printed in Japan
8511 S.P.

System Keyboard
NS-70



OWNER'S MANUAL
BEDIENUNGSANLEITUNG
MANUEL DU PROPRIETAIRE
MANUAL DEL USUARIO

IMPORTANT (in the United Kingdom)
Mains Supply (AC 240 V∿, 50 Hz only)

Do not make any connection to the Larger terminal coded E or coloured Green. The wires in the mains lead are coloured in accordance with following code:

Blue to N (Neutral) or Black
Brown to L (Live) or Red

If these colours do not correspond with the terminal identifications of your plug, connect as follows:
Blue wire to terminal coded N (Neutral) or coloured Black.
Brown wire to terminal L (Live) or coloured Red.
If in doubt – consult a qualified electrician.

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTIONS
- For AC operation, use only the power cord provided to prevent danger.
- Disconnect the AC plug when not in use.
- To prevent electric shock, do not remove screws, covers or cabinet. No user-serviceable parts inside. Refer servicing to qualified service personnel.

Voltage selector
The voltage selector is located on the rear of the instrument. Before connecting the power cord to an AC outlet, check that the correct voltage (120 V, 220 V or 240 V) for your area has been selected.

**The Pedal Keyboard Unit, Bench, Stand, Organ Expander Unit, Amplifier, Speakers and Speaker Stands on the front cover are all optional.*

Thank you for purchasing JVC's NS-70 System Keyboard. Before switching on, be sure to read the precautions below. To get full enjoyment from your NS-70, study this owner's manual. After reading, keep the manual handy for future reference.

PRECAUTIONS

- Use only the power cord provided.
- Disconnect the power cord immediately in the event of an electrical storm.
- In the event repair is required, see your local dealer or JVC-authorised service agency. Do not attempt any internal adjustments or repairs.
- Avoid storing the instrument
  - – under the direct rays of the sun;
  - – near a heater, stove, fireplace or other heat source;
  - – in extremely dusty environments or places subject to high vibrations.
- To clean the unit, use a dry cloth or one moistened with water or a neutral detergent.

When this unit is used with audio amplifier and speakers, to prevent damaging the speakers, keep the volume at normal playing level.
For the right combination of amplifier and speakers to be used, consult your JVC dealer.

CONTENTS

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Fascinating Chord (Automatic Accompaniment) 5
Compucorder (To Arrange and Store Tunes in Memory) .. 7
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Connection Terminals and Pitch Controls 16
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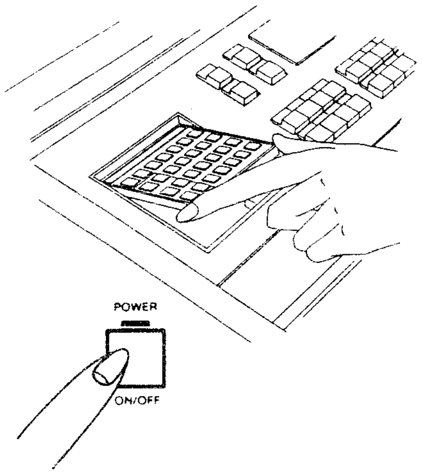
Troubleshooting 18
Specifications 20

CONTROL PANEL (Attached Sheet)
*For the following items (switches), refer to the separate volume "Control Panel" sheet
- Full PCM Stereo Rhythm
  - – Rhythm Tempo, Beat Conductor, Rhythm Reverb, Manual Drums, Hand Clap, Tambourine, Start/Stop, Synchro Start and Intro/Fill-in
- Sustain, Phaser Speed & Stereo Reverb
- Touch Response
- Stereo Effect – Symphonic & Celeste
- Ultra Chord
- Magic Foot
- Solo To Lower, Solo To Arpeggio, Lower To Upper & Bass To Lower

SOUND CREATOR MANUAL (Separate Volume)
* For the following items, refer to the separate "Sound Creator" manual.
- Guide for sound making using NS-70
- Parameter list
- Editing (Sound making)

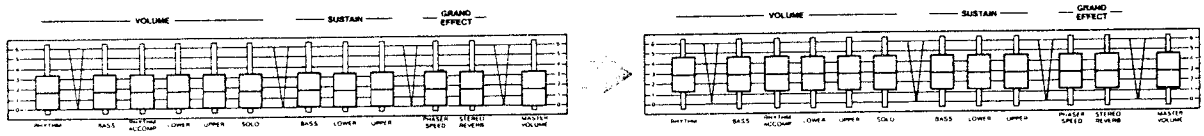
PREPARATION



Since an amplifier and speakers are not incorporated in the NS-70, connect this unit to an audio system (amplifier, speakers) before use. Use the provided stereo pin cord to connect the AUX OUT terminals of this unit to the AUX IN (or LINE IN) terminals of the amplifier.
(Be sure to make the correct (L) and (R) connections.)

1. Connect the power cord provided. (The AC STANDBY indicator lights.)
2. Insert the DIGITAL COMPOSER provided.
3. Press the POWER switch. Several seconds later, the LEDs begin running on the voice select swtiches until one of them is pressed. For each voice section, when any switch is pressed, the LED stops.
   Pressing the POWER switch again turns the power off.

VOLUME
The volumes of the six channels of sound are controlled so that their balance can be checked at a glance. Use the MASTER VOLUME control to adjust the overall volume.
Before playing set all slide controls to the center positions.



PRESET VOICES & CUSTOM VOICES

Two types of voices, preset and custom, are included;

(A) **Preset voices:** These are indicated above the voice select switches; they cannot be erased.

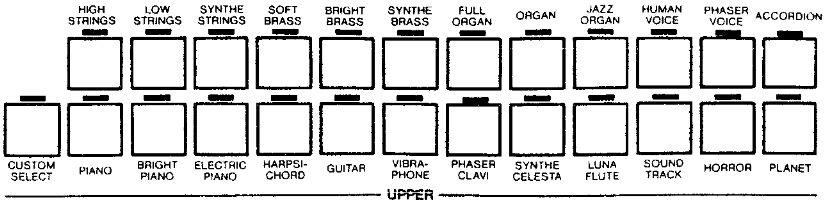
(B) **Custom voices:** Voices which are made as desired, as well as modified preset voices, can be stored in these switches. (See separate volume "Sound Creator".) By using the optionally available Voice Pack voices used by professional musicians can also be stored here. Press the CUSTOM switch located on the lower left side of each voice section to change from the preset voice to the custom voice. (See below)

The following five preset voice groups are avilable with the NS-70

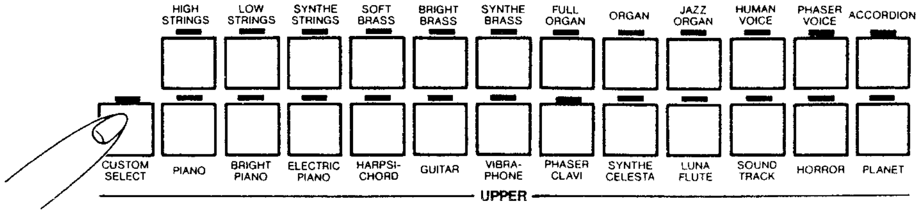
Voice group	No. of voices	No. of notes produced at a time	Keyboard to be played
SOLO/ARPEGGIO	15 preset + 15 custom	1	Normally upper manual, can be moved to lower manual (SOLO TO LOWER). Can also be transferred to play the Arpeggio patterns in the Fascinating Chord (SOLO TO ARPEGGIO).
UPPER	24 preset + 24 custom	8	Upper manual
LOWER	13 preset + 13 custom	8 (4)	Normally lower manual, can be moved to upper manual (LOWER TO UPPER). With Fascinating Chord on, the number of produced notes is four.
RHYTHM ACCOMP	7 preset + 7 custom	4	None, interlocked with Fascinating Chord
BASS	7 preset + 7 custom	1	Normally pedal keyboard, can be moved to lower manual (BASS TO LOWER)

How to select a custom voice

For example, the PHASER CLAVI voice is selected for the upper manual in the figure below.


HIGH STRINGS
LOW STRINGS
SYNTHE STRINGS
SOFT BRASS
BRIGHT BRASS
SYNTHE BRASS
FULL ORGAN
ORGAN
JAZZ ORGAN
HUMAN VOICE
PHASER VOICE
ACCORDION
CUSTOM SELECT
PIANO
BRIGHT PIANO
ELECTRIC PIANO
HARPSI-CHORD
GUITAR
VIBRA-PHONE
PHASER CLAVI
SYNTHE CELESTA
LUNA FLUTE
SOUND TRACK
HORROR
PLANET
UPPER

When the CUSTOM SELECT switch is pressed (LED lights) . . .


HIGH STRINGS
LOW STRINGS
SYNTHE STRINGS
SOFT BRASS
BRIGHT BRASS
SYNTHE BRASS
FULL ORGAN
ORGAN
JAZZ ORGAN
HUMAN VOICE
PHASER VOICE
ACCORDION
CUSTOM SELECT
PIANO
BRIGHT PIANO
ELECTRIC PIANO
HARPSI-CHORD
GUITAR
VIBRA-PHONE
PHASER CLAVI
SYNTHE CELESTA
LUNA FLUTE
SOUND TRACK
HORROR
PLANET
UPPER

A voice (PHASER SYNTHE) different from the indicated voice (PHASER CLAVI) will be produced; this is the "custom voice" and the indicated voice (PHASER CLAVI in this example) is the "preset voice".

For each preset voice indicated on the control panel, there is a custom voice as well.

- * Voices may be modified and stored in these switches or transferred from a Voice Pack (optionally available in the future), and they may differ from those in the table below.
- * When no voice is produced by the custom voice sections, or when a prepared custom voice from the table below is desired to be recalled, refer to the separete volume "Sound Creator" page 14.
- * A phase effect can be added to the voices marked with an asterisk(*); phase depth can be adjusted by the Phaser Speed control knob. The PHASER SPEED control has no effect on voices other than those marked with a asterisk.

SOLO

PRESET		TRUMPET	TROMBONE	PAN FLUTE	JAZZ FLUTE	VIOLIN	CELLO	HAWAIIAN GUITAR
CUSTOM		5TH TRUMPET	HORN	RECORDER	FUNNY FLUTE	HUMAN VOICE	SYNTHE CELESTA	BANJO
PRESET	CLARINET	SAXOPHONE	HARMONICA	WHISTLE	ROCK GUITAR	SYNTHE PERCUS	UFO	STORM
CUSTOM	OBOE	BASSOON	SYNTHE LEAD 1	SYNTHE LEAD 2	*PHASER GUITAR	METAL PERCUSSION	VENUS	WAVE

UPPER

PRESET	HIGH STRINGS	LOW STRINGS	SYNTHE STRINGS	SOFT BRASS	BRIGHT BRASS	SYNTHE BRASS	FULL ORGAN	ORGAN	JAZZ ORGAN	HUMAN VOICE	*PHASER VOICE	ACCORDION
CUSTOM	DUAL STRINGS	FAST STRINGS	SYNTHE STRINGS	HARD BRASS	5TH BRASS	STRING BRASS	THEATER ORGAN	SYNTHE ORGAN	PERCUSSION ORGAN	HUMAN VOICE 2	*PHASER STRINGS	ACCORDION 2
PRESET	PIANO	BRIGHT PIANO	ELECTRIC PIANO	HARPSICHORD	GUITAR	VIBRAPHONE	*PHASER CLAVI	SYNTHE CELESTA	LUNA FLUTE	SOUND TRACK	HORROR	PLANET
CUSTOM	HONKY-TONK PIANO	SYNTHE PIANO	HARP	SYNTHE HARPSICHORD	SITAR	CLAVICHORD	*PHASER SYNTHE	SYNTHE LEAD	COSMIC	PIANO STRINGS	CAVE ECHO	CYGNUS

LOWER

PRESET		HIGH STRINGS	LOW STRINGS	SOFT BRASS	SYNTHE BRASS	FULL ORGAN	ORGAN
CUSTOM		DUAL STRINGS	SYNTHE STRINGS	HARD BRASS	STRING BRASS	THEATER ORGAN	SYNTHE ORGAN
PRESET	PIANO	ELECTRIC PIANO	GUITAR	HUMAN VOICE	BANDONEON	*PHASER CLAVI	SOUND TRACK
CUSTOM	HONKY-TONK PIANO	HARP	CLAVICHORD	SYNTHE CELESTA	PIANO STRINGS	*PHASER STRINGS	PLANET

RHYTHM ACCOMP

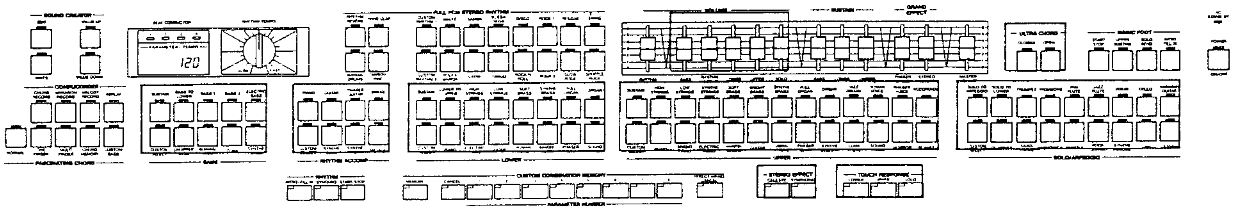
PRESET	PIANO	GUITAR	*PHASER GUITAR	BRASS
CUSTOM	ELECTRIC PIANO	ROCK GUITAR	*PHASER CLAVI	CONTINUOUS VOICE
PRESET		SYNTHE CLAVI	SYNTHE WOW	METALIC
CUSTOM		SYNTHE HARPSICHORD	TRAIN	CONTINUOUS STRINGS

BASS

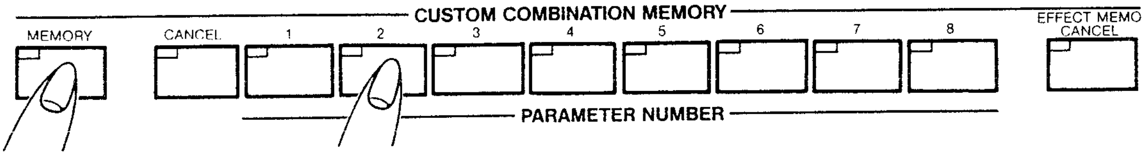
PRESET		BASS 1	BASS 2	ELECTRIC BASS
CUSTOM		BASS 3	ORGAN BASS	ELECTRIC BASS 2
PRESET	CHOPPER BASS	BOWING BASS	TUBA	SYNTHE BASS
CUSTOM	CHOPPER BASS 2	STRING BASS	SYNTHE BRASS	SYNTHE BASS 2

CUSTOM COMBINATION MEMORY

Each selection for SOLO, UPPER, LOWER, RHYTHM ACCOMP and BASS voices and their volume balance and up to eight different switch settings of Ultra Chord, Stereo Effect, Touch Response, etc. can be stored in memory. These settings can also be transferred to the optional Digital Memory Pack for storage.



How to store

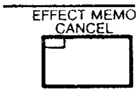


1) After each section above is set as desired, press one of Custom Combination Memory switches 1 to 8 while pressing the MEMORY switch; the setting is now stored in memory.
2) The stored setting can be recalled at any time by pressing its Custom Combination Memory switch. (The selected switch LED lights.)
3) To go back to the previous setting, press the CANCEL switch.

The following settings cannot be stored in the CUSTOM COMBINATION MEMORY:
Full PCM Stereo Rhythm. Rhythm Tempo, Rhythm volume, Stereo Reverb, Sustain control knob, Phaser Speed, Master volume, Compucorder, Magic Foot and Fascinating Chord.

- The recalled setting can be modified as desired; however, after releasing the setting by pressing the CANCEL switch, pressing the same numeric switch resumes the originally stored (before modification) setting condition.
- Data in the CUSTOM COMBINATION MEMORY remains stored for approx. two weeks after the NS-70's power has been turned off. To store the data for extended period of time, turn the power on every two weeks, or store the setting data and voice data into the optional Digital Memory Pack (NS-M10).
- After modifying the recalled setting, pressing one of the numeric (1 to 8) switches while pressing the MEMORY switch stores the modified setting condition.

EFFECT MEMORY CANCEL switch



Press this switch when only voice setting data is desired to be recalled using the CUSTOM COMBINATION MEMORY. When this switch is pressed and the indicator lights, the volume level indicated by the VOLUME knob, and the effects which were set before the switch was pressed are maintained.

The relationship between Custom Combination Memory and Volume

- The volume balance can be stored in the Custom Combination Memory; however, the volume level of the recalled setting may differ from the volume knob position on the VOLUME section. Therefore to resume the initial balance, it may be necessary to readjust individual volume knob positions.

FASCINATING CHORD (AUTOMATIC ACCOMPANIMENT)

FASCINATING CHORD is a JVC original automatic accompaniment system using the latest computer technology.

① When automatic accompaniment is not necessary

② When you do not know how to play chords on a keyboard

③ When you can play complex chords on a keyboard

①

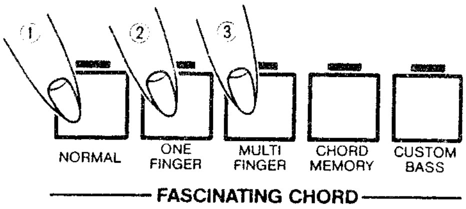
Press the NORMAL mode switch.

②

Press the ONE FINGER mode switch so that the LED lights.

③

Press the MULTI FINGER mode switch so that the LED lights.



①

Play melody and accompaniment manually.

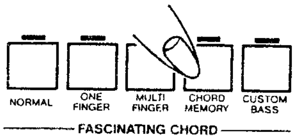
②③

Start rhythm and play on the lower manual keys, and the Bass and Accompaniment sound will be produced automatically according to the rhythm selected. The Lower voices are produced only when the lower manual keys are pressed. When Arpeggio is desired, press the SOLO TO ARPEGGIO switch at the upper left of the SOLO/ARPEGGIO voice section. (For ONE FINGER or MULTI FINGER chord generation, see below.)

When the CHORD MEMORY function is used, the same accompaniment is repeated until the next time a lower manual key is pressed.

CHORD MEMORY

Press the CHORD MEMORY switch so that the LED lights.

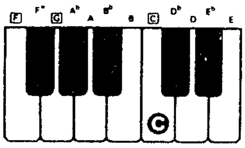


②

ONE FINGER

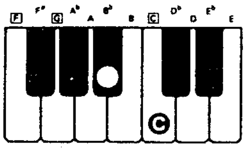
Major, minor, seventh and minor-seventh chords can be played with one to three fingers of the left hand.

Major chords
Example: C



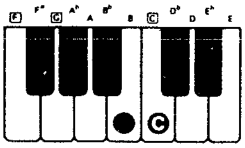
Press one of the C keys and the C major chord (Do-Mi-So harmony) is produced.

Minor chords
Example: Cm



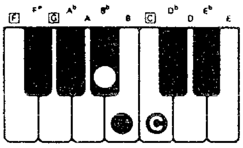
Press the C key together with any black key to the left of it.

Sevenths
Example: C7



Press the C key together with any other white key to the left of it.

Minor sevenths
Example: Cm7

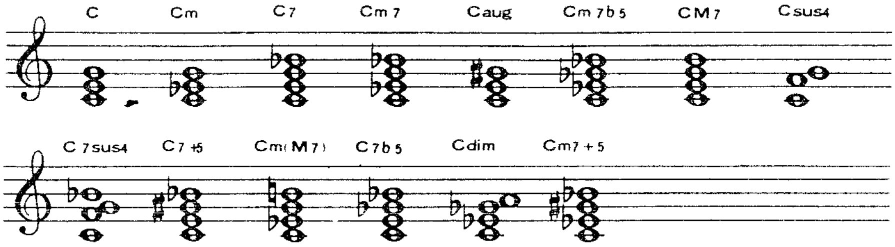

F
F#
G
A♭
A
B♭
B
C
D♭
D
E♭
E

Press the C key together with any black key and any white key to the left. (all three keys together).

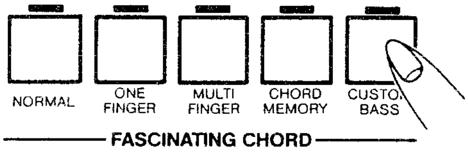
MULTI FINGER

Automatic accompaniment is possible with the chords played on the keyboard.

The following 14 chords can be played in any key.
(14 types x 12 notes = 168 chords)


C
Cm
C7
Cm7
Caug
Cm7b5
CM7
Csus4
C7sus4
C7+5
Cm(M7)
C7b5
Cdim
Cm7+5

CUSTOM BASS


NORMAL
ONE FINGER
MULTI FINGER
CHORD MEMORY
CUSTOM BASS
FASCINATING CHORD

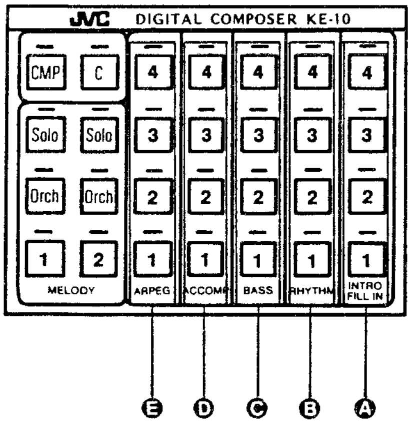
When the optional Pedal Keyboard is connected, pressing this switch cancels the bass sound even if the Fascinating Chord is used. The bass sound is produced according to notes played on the pedal keyboard.

Hint for playing when you cannot follow the rhythm

Set the CHORD MEMORY to off and SYNCHRO START to on. Rhythm and auto accompaniment play only when lower manual keys are pressed and stop when the keys are released. Rhythm and auto accompaniment re-start from the first beat when lower manual keys are pressed again.

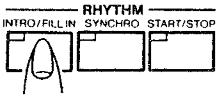
--To Give Variation to the Parts of FASCINATING CHORD (Automatic Accompaniment) --

The FASCINATING CHORD consists of five components; rhythm (plus intro/fill-in), bass, accomp. (rhythm accompaniment), arpeggio and lower (continuous sound of lower manual). The intro/fill-in, rhythm, bass, accomp and arpeggio are provided with four variations for each of 14 rhythms. The desired variation can be selected by pressing the variation switches $\boxed{1}$ $\boxed{2}$ $\boxed{3}$ $\boxed{4}$ of the DIGITAL COMPOSER.


JVC DIGITAL COMPOSER KE-10
CMP
C
Solo
Solo
Orch
Orch
1
2
MELODY
4
3
2
1
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN
Ⓔ
Ⓓ
Ⓒ
Ⓑ
Ⓐ

Ⓐ INTRO/FILL-IN

The intro/fill-in (with the variation pattern selected on the DIGITAL COMPOSER) is played only when the INTRO/FILL-IN switch is pressed.

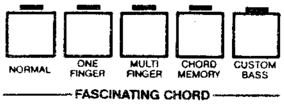

RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP

Ⓑ RHYTHM

4 variations are preset for each basic rhythm. (14 x 4 = 56 preset rhythms)

Ⓒ BASS

* When the CUSTOM BASS switch is pressed, the bass sound is cancelled from the auto-accompaniment and replaced with the sound produced by the pedal keyboard.


NORMAL
ONE FINGER
MULTI FINGER
CHORD MEMORY
CUSTOM BASS
FASCINATING CHORD

Ⓓ ACCOMP

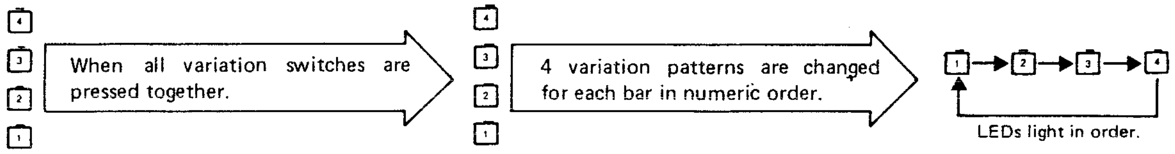
The voice selected by the RHYTHM ACCOMP switches is played along with the rhythm.

Ⓔ ARPEGGIO

When the SOLO TO ARPEGGIO switch is pressed, the normal arpeggio sound is replaced with a voice selected from the SOLO SYNTHE PRESETS and it is played with the $\boxed{1}$ $\boxed{2}$ $\boxed{3}$ $\boxed{4}$ arpeggio patterns. In this case, adjust the arpeggio volume with the SOLO control of the VOLUMES. The Solo/Arpeggio voice will not be produced unless play is started with Fascinating Chord on, even when the Solo To Arpeggio LED is lit.

Variation patterns of the DIGITAL COMPOSER can be arranged to make a tune.

Example 1


4
3
2
1
4
3
2
1
1→2→3→4

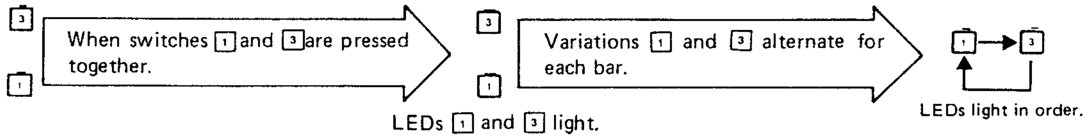
When all variation switches are pressed together.

All LEDs light.

4 variation patterns are changed for each bar in numeric order.

LEDs light in order.

Example 2



When switches 1 and 3 are pressed together.

LEDs 1 and 3 light.

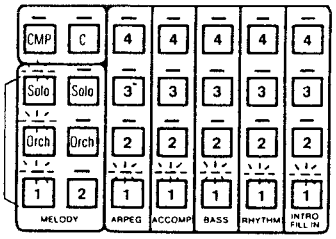
Variations 1 and 3 alternate for each bar.

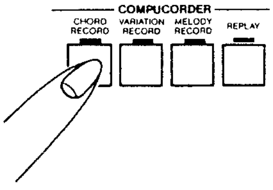
LEDs light in order.

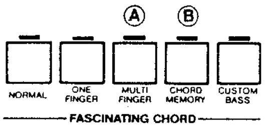
COMPUCORDER (TO ARRANGE AND STORE TUNES IN MEMORY)

1 To record a whole performance (chords, melody (monophonic) melody, accompaniment variations) as it is played;

(1) Press the chord record switch, the LEDs light or blink as shown.


CMP
C
4
4
4
4
4
Solo
Solo
3
3
3
3
3
Orch
Orch
2
2
2
2
2
1
2
1
1
1
1
1
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN


COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY


Ⓐ
Ⓑ
NORMAL
ONE FINGER
MULTI FINGER
CHORD MEMORY
CUSTOM BASS
FASCINATING CHORD

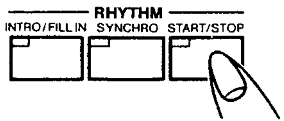
Ⓐ Press the MULTI FINGER switch to play in the MULTI FINGER mode.

Ⓑ When the CHORD MEMORY switch is pressed the accompaniment continues even after the left-hand keys are released.

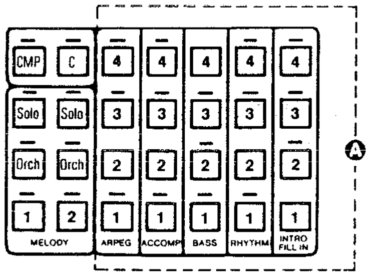
*If LEDs do not light as shown, switch the power OFF and try again.

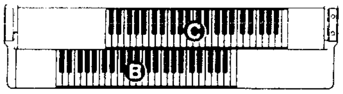
(2) At this time, both Orch and Solo LEDs blink. With this condition, the recorded melody will be replayed using the voices of both the SOLO/ARPEGGIO and UPPER. To replay only with a voice of the UPPER, press the Solo switch before recording so that the LED goes off. To replay only with a voice of the SOLO/ARPEGGIO, press the Orch switch before recording so that the LED goes off. And when the Orch and Solo are pressed alternately during recording, the pattern is recorded as they are changed.

- Up to 128 bars (with minimum unit 1 chord/beat) and up to approx. 500 notes of melody per tune can be recorded.


RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP

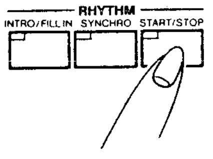
(3) Start rhythm to start recording. To start rhythm, press the START/STOP switch or use the SYNCHRO START function.


CMP
C
4
Solo
3
Orch
2
1
2
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN
Ⓐ



Ⓐ Variations are recorded as switches are changed.
Ⓑ Chords are recorded as they are played on the lower manual.
Ⓒ Melody is recorded as it is played on the upper manual.
(Only monophonic melody is recorded.)

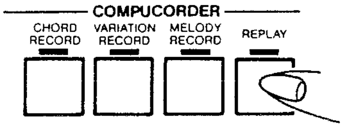
If you cannot play chords and melody and change variations at the same time, start with chord recording alone and later proceed to record melody (operation **3** below) then change accompaniment variations (operation **4**).


RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP

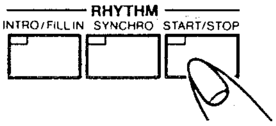
(4) Press the START/STOP switch to stop rhythm.

- If you do not change accompaniment variation switches 1 2 3 4 when you record chords, variations 1 are recorded for all parts.
- All previously-recorded memories are cleared when the CHORD RECORD switch is pressed and rhythm is started. Thus, before proceeding to **3** recording melody alone and **4** recording accompaniment variations alone, make sure that the CHORD RECORD switch is off.

2 To replay the recorded tune


COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY

(1) Press the REPLAY switch so that its LED lights.


RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP

(2) Press the START/STOP switch to start replay. You can play a supporting melody together with the replayed melody.

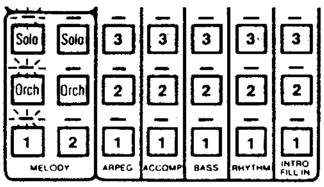
⇩

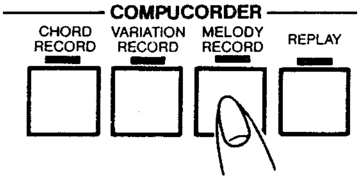
(3) Press the START/STOP switch again to stop replay of accompaniment and melody.

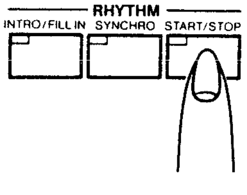
- When the pattern switch for rhythm, bass accomp or arpeggio is pressed to blink, it can be modified independently. When the pattern switches for two or more sections are pressed to blink, they can be modified simultaneously.

3 To record melody alone

(1) Press the MELODY RECORD switch and the LEDs light as shown below.


Solo
Orch
3
2
1
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

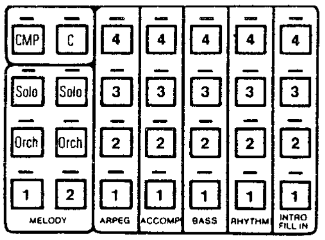

COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY


RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP

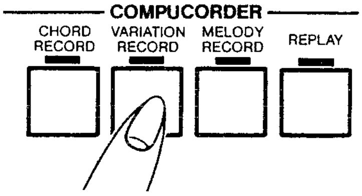
(2) Start rhythm and play the melody on the upper manual.

(3) Melody recording automatically stops at the end of the number of bars for which chords have been recorded.

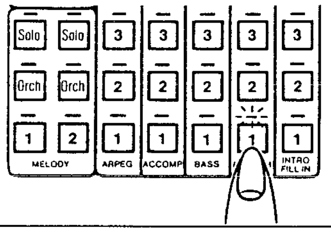
4 To record variations alone


CMP
C
4
Solo
Orch
1
2
3
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

(1) Press the VARIATION RECORD switch.


COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY

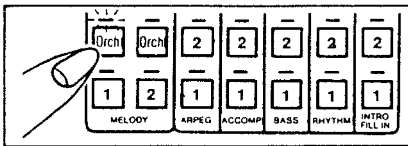
All variation switches on the Digital Composer go off.


Solo
Orch
1
2
3
MELODY
ARPEG
ACCOMP
BASS
INTRO FILL IN

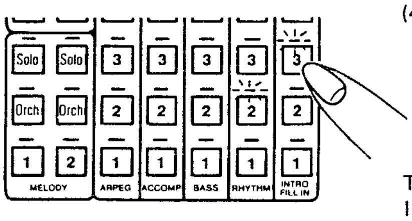
(2) To choose from the varaitions of RHYTHM (together with INTRO/FILL IN), BASS, ACCOMP and ARPEGGIO, press variation switches 1 2 3 or 4 as desired so that the LEDs blink.

If you do not want to change particular variation patterns as they were recorded in CHORD RECORD (operation 1), do not press the variation switch.

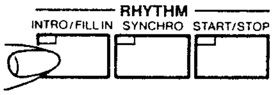
When a variation switch is pressed twice, the LED that was lit goes off and the part is muted.


Orch
1
2
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

(3) It is also possible to select the recorded melody to be played by the voices of UPPER alone, SOLO/ARPEGGIO alone, or both. Press either or both of the Orch (UPPER) and Solo (SOLO/ARPEGGIO) switches as desired.


Solo
Orch
1
2
3
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

(4) Start rhythm and change variation patterns by pressing required variation switches. Pattern sequences are recorded as they are pressed.

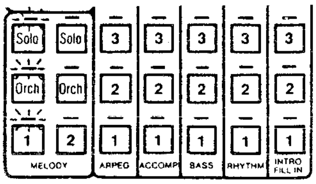

RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP

To insert intro/fill-in, press the INTRO/FILL IN switch while the selected INTRO/FILL IN variation switches 1 2 3 or 4 are blinking.

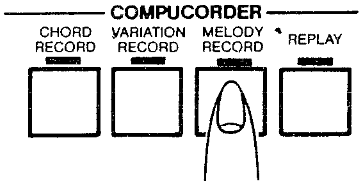
(5) Rhythm stops at the end of the number of bars for which chords have been recorded.

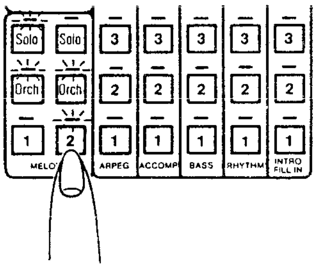
- If you do not change accompaniment variation switches 1 2 3 4 when you record chords, variations 1 are recorded for all parts.
- When the CHORD RECORD switch is pressed to start rhythm, all the previous recorded sections are cleared. Therefore, when only the melody (operation 3) or variation (operation 4) is desired to be stored, make sure that the CHORD RECORD switch is off (the LED is not lit) before starting rhythm.

[5] To record a new melody and clear the recorded melody


Solo
Solo
Orch
Orch
1
2
3
2
1
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

(1) Press the MELODY RECORD switch; the LEDs light as shown.


COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY


Solo
Solo
Orch
Orch
1
2
3
2
1
MELO
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

(2) Press the Melody switch [2] on the Digital Composer; the LEDs light as shown. This time, the Melody [2] [Orch] (for Upper) LED blinks and the [Solo] (for Solo/Arpeggio) LED goes off.
To record melody into Melody [2] with [Solo], press the [Solo] switch so that the LED blinks. Since the [Solo] (Solo/Arpeggio) voices are monophonic, the previously recorded voice in the Melody [1] will be cancelled (cleared) automatically when the melody is recorded into Melody [2] with [Solo].
(However, vairations can be modified after the melody has been recorded. See Operation [4].)

(3) Press the START/STOP switch to start rhythm; the recorded accompaniment and the melody [1] are replayed. Over top of this, a new melody may be played on the upper manual.

(4) The rhythm stops at the end of the number of bars for which chords have been recorded; melody recording automatically stops.

- When the sound of any part is not required at the beginning of the tune (to record variation pattern "off" condition), press one of variation switches [1] [2] [3] [4] so that its LED blinks, then press the same switch so that the LED goes off, and start the rhythm.
- Any one of RHYTHM, BASS, ACCOMP and ARPEGGIO pattern sequences can be re-arranged by pressing a variation switch so that its LED blinks. When re-arranging more than one sequence, press variation switches so that more than one LED blinks.
- To record intro/fill-in the first bar of a tune, press the INTRO/FILL IN switch immediately after starting the rhythm (within the first half of the 1st bar, or within one beat when Waltz is selected). When the pattern sequence recording is started by pressing the INTRO/FILL IN switch alone, the intro/fill-in variation pattern will not be recorded for the 1st bar.

CUSTOM RHYTHM (COMPOSITION OF RHYTHM AND FASCINATING CHORD)

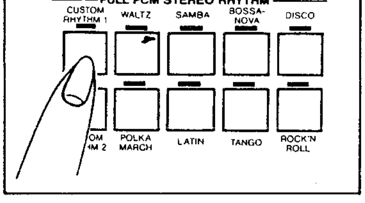
Original accompaniment patterns of FASCINATING CHORD, i.e. rhythm, intro/fill-in, rhythm accompaniment, bass and arpeggio, can be composed as desired and stored in the DIGITAL COMPOSER. Filled with these accompaniment patterns, sequences and melody memories, additional DIGITAL COMPOSER packs obtained from your JVC dealer, can be volumes in your music library.

There are two methods of composition: [1] Composition of entirely new patterns, and [2] Modification of preset patterns.

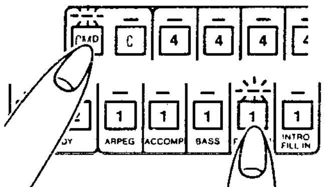
[1] Creation of Entirely New Patterns

[A] Creation of rhythm patterns

(1) Select CUSTOM RHYTHM 1 (or 2). Make sure that rhythm is not running.

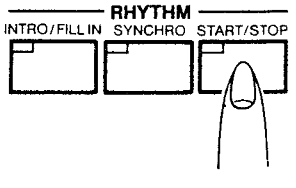


(2) Press the [CMP] switch then press one of RHYTHM variation switches [1] [2] [3] [4]. The green [CMP] LED and the red LED of the selected variation switch blink.



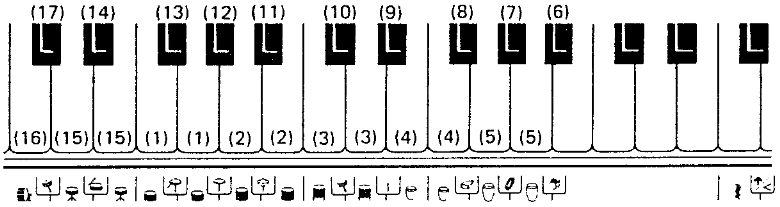
Press the [C] switch to clear old data of tune previously recorded.

(3) With a slower tempo, start rhythm.



(4) With the tone keeping time, compose a rhythm by hitting the keys that correspond to the desired percussion instruments. Percussion sounds are recorded in one-bar patterns.

Each key on the left two octaves on the lower manual produces percussion sounds as shown below.



Note:
Only one percussion sound can be produced from each channel at any one time.

CH1	* (1)	HT:	High tom-tom
	* (2)	MT:	Middle tom-tom
	* (3)	LT:	Low tom-tom
	* (4)	SC:	Small conga
	(5)	LC:	Large conga
CH2	(6)	HC:	Hand clap
	(7)	TB:	Tambourine
CH3	(8)	CB:	Cowbell
	* (9)	CY:	Cymbal
CH4	(10)	CA:	Cabasa
	(11)	OH:	Open high-hat
	* (12)	CHH-2:	Closed high-hat (2)
	* (13)	CHH-1:	Closed high-hat (1)
CH5	(14)	RS:	Rim shot
	* (15)	SD:	Snare drum
CH6	* (16)	BD:	Bass drum
	(17)	CA:	Cabasa

Accent (♩>) key (F#$_3$):
When composing an original rhythm variation pattern, accent can be given to instruments marked with an asterisk (*) by pressing this key together with the key for the instrument.

Rest (𝄽) key (F$_3$):
Use to mute the sound of percussion instruments (when composing RHYTHM), notes (when composing BASS or ARPEGGIO) or accompaniment voices (when composing ACCOMP)

- Percussion is reproduced through six channels and only one instrument per channel can be played at a time, When, for example, cymbal and cowbell are input together, only one will be recorded. When they are input one after another, the sustain of the cymbal is cut the moment the cowbell is played.

(5) Each percussion instrument can be recorded separately and superimposed while the one-bar cycles are repeated. The minimum beat unit is ♬ and notes shorter than this are converted to this unit. A faster rhythm can easily be input by slowing down the tempo.

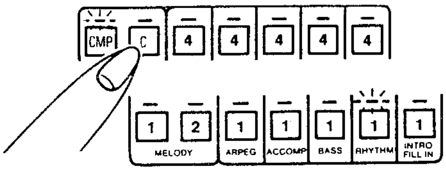
(6) Sounds input by mistake or those you don't like can be cleared after recording, without stopping rhythm.

① To clear everything and restart from the very beginning:

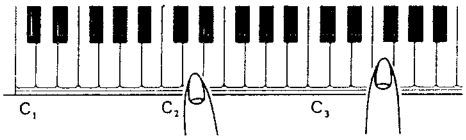
② To clear only some notes of a certain instrument:

Check that the green CMP LED blinks. (If not, go back to (1).)

① Press the C switch.


CMP
C
4
4
4
4
4
1
2
1
1
1
1
1
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

② While pressing the rest key (𝄽), press the key to be muted for the period you want to clear the notes.



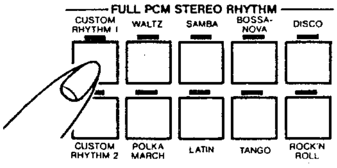
Keep the rhythm running and add new instruments.

(7) Stop rhythm when you have completed the composition.

- Accent can be added to the tom-tom, cymbal, closed high-hat, snare drum or bass drum rhythm voice. Add accent by pressing the keys for each percussion instrument while pressing the accent key (> F$\#_3$) while recording.
- Cabasa can be palyed with two keys, the lowest C# and C$\#_2$, one octave above. To delete the cabasa sound, use the same key with which it was composed.
- The INTRO/FILL IN variation patterns can be created in the same way as the RHYTHM patterns.

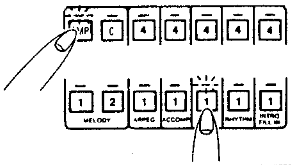
B Composition of BASS patterns

(1) Select CUSTOM RHYTHM 1 (or 2).

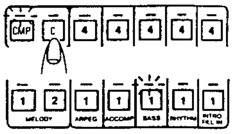

FULL PCM STEREO RHYTHM
CUSTOM RHYTHM 1
WALTZ
SAMBA
BOSSA-NOVA
DISCO
CUSTOM RHYTHM 2
POLKA MARCH
LATIN
TANGO
ROCK'N ROLL

Make sure that rhythm is not running.

(2) Press the CMP switch then press one of BASS variation switches 1 2 3 4, The green CMP LED and red LED of the selected variation switch both blink.

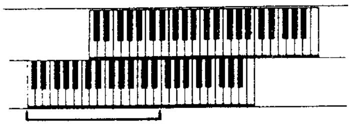

CMP
C
4
4
4
4
4
1
2
1
1
1
1
1
MELODY
ARPEG
ACCOMP
RHYTHM
INTRO FILL IN

(3) Press the switch to clear the bass variation pattern which has been previously recorded for the selected variation switch.


CMP
C
4
4
4
4
4
1
2
1
1
1
1
1
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

The previously recorded bass pattern has now been cleared.

(4) Press the START/STOP switch to start rhythm and play bass pattern with the rhythm. On the lower keyboards the keys between C_1 and E_3, are used for playing bass.



Bass composition range

Note:
When composing bass, always play patterns in the key of C major.

(5) Two methods are possible for changing the recorded bass pattern.

① To clear everything and restart from the very beginning:

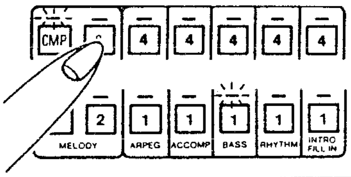
② To clear only some notes:

①　②

Check that the rhythm is running and that the green CMP LED is blinking. (If not, go back to (1).)

①

Press the C switch.

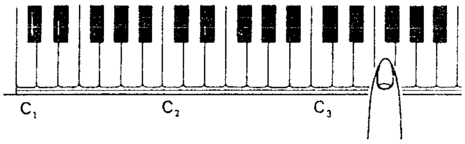

CMP
C
4
4
4
4
4
2
1
1
1
1
1
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

①

Play new bass pattern.

②

Press the rest key (𝄽) for the period you want to clear the bass notes.



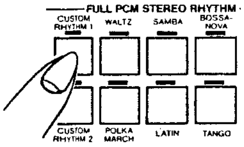
②

Add new notes to the blank space.

(6) Stop rhythm when you have completed the composition.

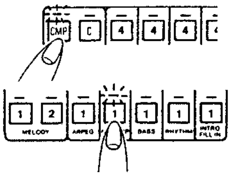
C Composition of ACCOMP patterns

(1) Press CUSTOM RHYTHM 1 (or 2).

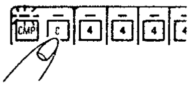

FULL PCM STEREO RHYTHM
CUSTOM RHYTHM 1
WALTZ
SAMBA
BOSSA-NOVA
CUSTOM RHYTHM 2
POLKA MARCH
LATIN
TANGO

Make sure that rhythm is not running.

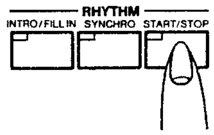
(2) Press the CMP switch then press one of ACCOMP variation switches 1 2 3 4. The green CMP LED and the selected variation switch both blink.

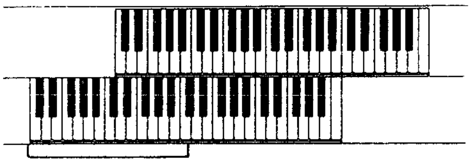

CMP
C
4
4
4
1
2
1
1
1
1
MELODY
ARPEG
BASS
RHYTHM
INTRO FILL IN

(3) Press the C switch to clear the accompaniment pattern which has been previously recorded by the selected variation switch. The previously recorded accompaniment pattern has now been cleared.



(4) Press the START/STOP switch to start rhythm and play rhythm accompaniment pattern with the rhythm. Any key between C_1 and C_3 on the lower manual produces the same accompaniment sound.


RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP



* Accompaniment composition range

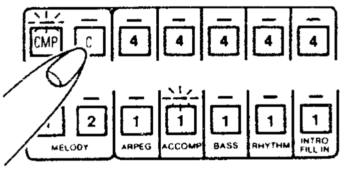
(5) Two methods are possible for changing the recorded rhythm accompaniment pattern.

① To clear everything and restart from the very beginning:

② To clear only some beats:

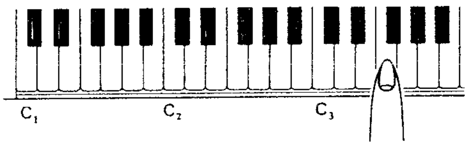
Check that the rhythm is running and green CMP LED blinks. (If not, go back to (1).)

① Press the C switch.


CMP
C
4
4
4
4
4
2
1
1
1
1
1
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN

① Play new accompaniment pattern.

② Press the rest key (𝄽) for the period you want to clear the sound.



② Add new notes to the blank space.

(6) Stop rhythm when you have completed the composition.

D Creation of ARPEGGIO patterns

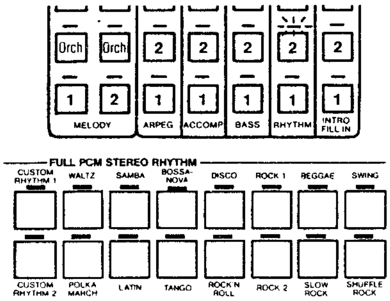
The ARPEGGIO pattern are composed in the same way as are the BASS patterns. See pages 12 to 13.

2 Modification of Preset Patterns

First transfer (copy) the preset pattern to be modified then modify it. All patterns of rhythm, intro/fill-in, bass, rhythm accompaniment and arpeggio are transferred by the same method.

Example To transfer BOSSA NOVA variation 2 to CUSTOM RHYTHM 1 variation 4 :

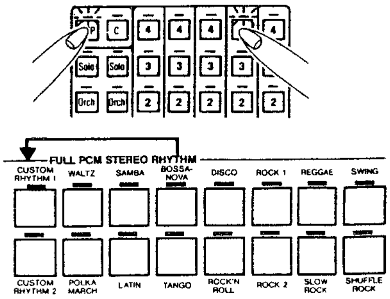
(1) Press the FULL PCM STERO RHYTHM switch of the desired rhythm style, BOSSA NOVA in this example, and the variation switch of the pattern to be modified, 2 in this example. Make sure that rhythm is not running.


Orch
Orch
2
2
2
2
2
1
2
1
1
1
1
1
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN
FULL PCM STEREO RHYTHM
CUSTOM RHYTHM 1
WALTZ
SAMBA
BOSSA-NOVA
DISCO
ROCK 1
REGGAE
SWING
CUSTOM RHYTHM 2
POLKA MARCH
LATIN
TANGO
ROCK'N ROLL
ROCK 2
SLOW ROCK
SHUFFLE ROCK

(2) To transfer BOSSA NOVA 2 to CUSTOM RHYTHM 1 4 , press the CMP switch (the green LED lights) and press variation switch 4 (red LED blinks). The BOSSA NOVA LED goes off and CUSTOM RHYTHM 1's LED automatically lights.

Note:

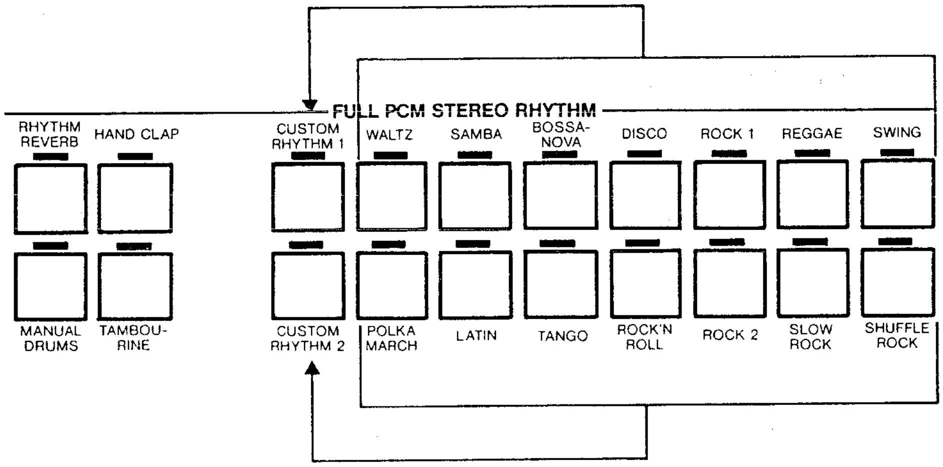
When creating a 3-beat pattern, be sure to press the WALTZ switch of the Full PCM Stereo Rhythm and then press the CMP switch and the desired rhythm pattern switch.


C
4
4
4
4
Solo
Solo
3
3
3
3
Orch
Orch
2
2
2
2
2
FULL PCM STEREO RHYTHM
CUSTOM RHYTHM 1
WALTZ
SAMBA
BOSSA-NOVA
DISCO
ROCK 1
REGGAE
SWING
CUSTOM RHYTHM 2
POLKA MARCH
LATIN
TANGO
ROCK'N ROLL
ROCK 2
SLOW ROCK
SHUFFLE ROCK

(3) Press the START/STOP switch to start rhythm: CUSTOM RHYTHM $\boxed{4}$ produces the same rhythm variation pattern as BOSSA NOVA variation $\boxed{2}$. (With rhythms composed in two-bar cycles, only the first bar is transferred.)

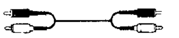
(4) After clearing undesired notes using the rest key (𝄽) add new notes to create an original pattern. When finished, stop rhythm by pressing the Start/Stop key.

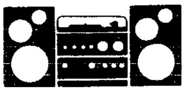
Note:
Variation patterns of the seven rhythms in the upper row can be transferred to CUSTOM RHYTHM 1, and those in the lower row, to CUSTOM RHYTHM 2.


FULL PCM STEREO RHYTHM
RHYTHM REVERB
HAND CLAP
CUSTOM RHYTHM 1
WALTZ
SAMBA
BOSSA-NOVA
DISCO
ROCK 1
REGGAE
SWING
MANUAL DRUMS
TAMBOURINE
CUSTOM RHYTHM 2
POLKA MARCH
LATIN
TANGO
ROCK'N ROLL
ROCK 2
SLOW ROCK
SHUFFLE ROCK

- The $\boxed{\text{C}}$ switch operation is possible only during composition (with green $\boxed{\text{CMP}}$ LED lit and red LED of the selected variation switch blinking).
- The $\boxed{\text{CMP}}$ switch is not effective when the rhythm is running.

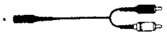
CONNECTION TERMINALS & PITCH CONTROLS


CN-160

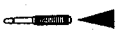


AUX IN/AUX OUT terminals

To connect a stereo system or tape deck, use a CN-160 Conenction cord (stereo phono plugs – stereo phono plugs) provided.


CN-132

To connect a monaural radio cassette recorder, etc., use a CN-132 Connection cord (stereo phono plugs – mono miniplug).


AP-100

To connect a mono keyboard amp or guitar amp, use a CN-132 connection cord together with an AP-100 Plug Adapter (mono miniplug – mono standard phone plug).

FOOT SWITCH connector

When the Foot Switch is connected to this, intro/fill-in, bend, orchestra sustain or start/stop can be operated by foot. This is also used for connecting the Pedal Keyboard (NS-P10/20).

MIDI IN/OUT/THROUGH terminals

(see next page)

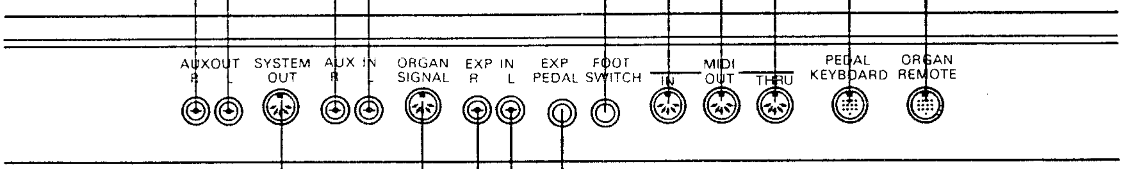
PEDAL KEYBOARD terminal

Connect the optional Pedal Keyboard Unit NS-P10/P20 using this terminal.

ORGAN REMOTE terminal

Connect the remote control unit of the Organ Expander NS-T90 to this terminal.

NS-70 Rear Panel



SYSTEM OUT terminal

Use this terminal when the optional Tone Cabinet for stage play is used. (Available in the future.)

ORGAN SIGNAL terminal

When the optional Organ Expander (NS-T90) is used, connect the ORGAN SIGNAL terminal of the Organ Expander Unit to this terminal.

EXP PEDAL connector

By using the KX-20 Expression Pedal, the master volume can be controlled by foot. This is also used to connect the Pedal Keyboard Unit (NS-P10/20).

EXP IN terminals (R/L)

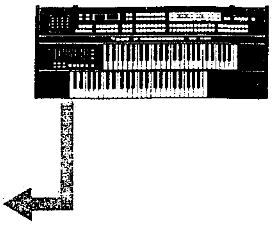
These terminals are used in a similar manner to the AUX IN terminals; however, the volume level of the sound input can be varied by attaching the optional Expression Pedal to these terminals.

Headphone jack

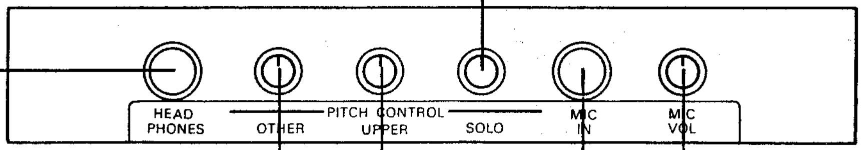
The sound of the NS-70 can be monitored using headphones plugged into this jack. In this case, connection to an amplifier and speakers is unnecessary.

SOLO PITCH control

Adjusts the pitch of the SOLO/ARPEGGIO voice.



Front panel



OTHER PITCH control

Adjusts the pitch of other sections. (LOWER, BASS, ACCOMP).

UPPER PITCH control

Adjusts the pitch of the UPPER voice.

MIC IN jack/MIC VOL control

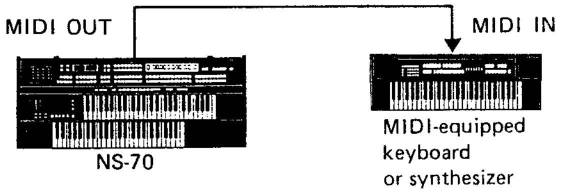
Connect a mono microphone or electric guitar and adjust the volume with the control. The Stereo Reverb effects can also be used for the voice or guitar.

MIDI (MUSICAL INSTRUMENT DIGITAL INTERFACE)

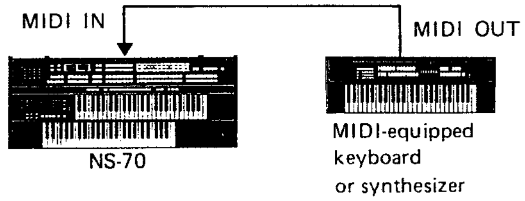
MIDI stands for Musical Instrument Digital Interface. It is an international standard for the transmission and reception of information by means of digital signal between musical instruments or between musical instruments and computers. Using this connection, when another MIDI-equipped synthesizer, electric piano or keyboard, etc. is connected, the other instrument can be controlled through the NS-70. When a computer is connected using a MIDI interface unit, musical entertainment can be greatly expanded.

(1)

Playing a MIDI-equipped keyboard instrument by playing the NS-70.

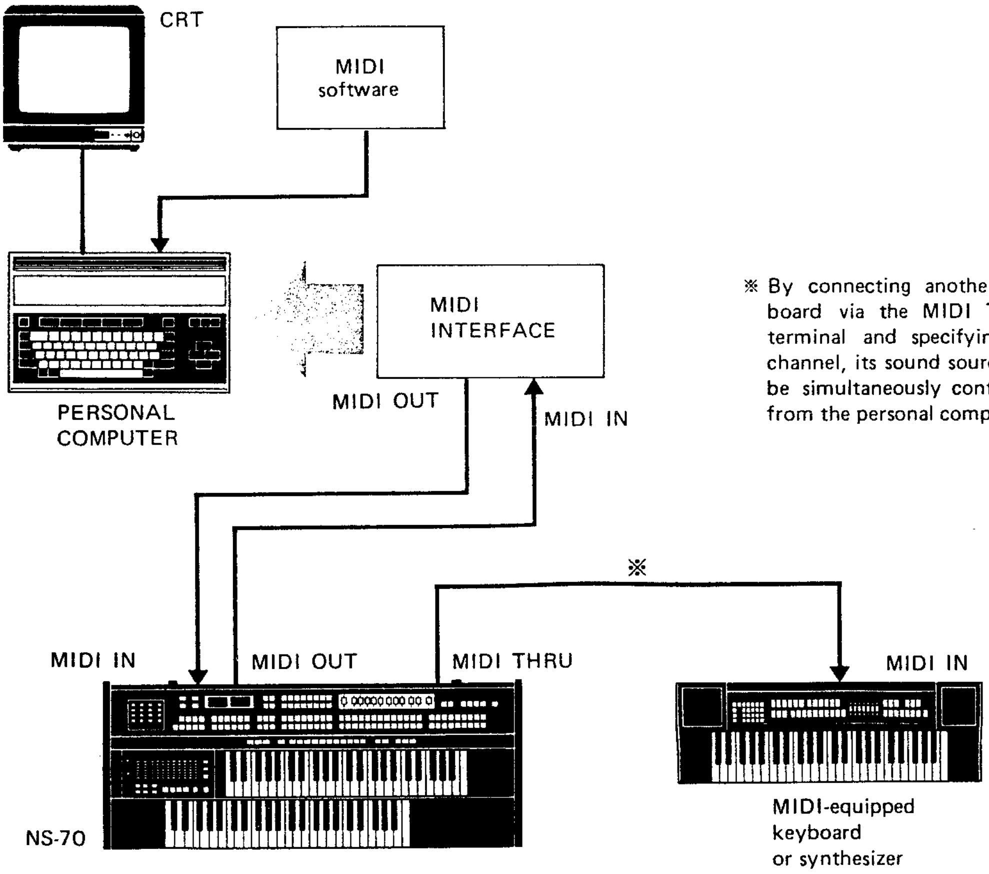

MIDI OUT
MIDI IN
NS-70
MIDI-equipped
keyboard
or synthesizer

Playing the NS-70 by playing another MIDI-equipped keyboard:


MIDI IN
MIDI OUT
NS-70
MIDI-equipped
keyboard
or synthesizer

(2)

For more sophisticated music composing/editing, connect a personal computer via a MIDI interface unit. The sound sources in the NS-70 can be controlled while monitoring on the CRT display.


CRT
MIDI
software
PERSONAL
COMPUTER
MIDI
INTERFACE
MIDI OUT
MIDI IN
※
MIDI IN
MIDI OUT
MIDI THRU
MIDI IN
NS-70
MIDI-equipped
keyboard
or synthesizer

※ By connecting another keyboard via the MIDI THRU terminal and specifying the channel, its sound source can be simultaneously controlled from the personal computer.

The NS-70 is an electronic orchestra incorporating several preset sound sources sections and each of them are assigned independent channel numbers. By specifying the channel numbers on the personal computer, music can be edited for each sound source.

NS-70 MIDI Implementation Chart

○ : Available
X : Not available

FUNCTION		TRANSMITTED			RECOGNIZED					REMARKS
		UPPER	LOWER	PEDAL	UPPER	LOWER	ARPEGGIO	PEDAL	RHYTHM	
BASIC CHANNEL	default	1	2	15	1	2	*14	*15	16	*shows Normal mode only
	changed	X	X	X	1 ~ 16	1 ~ 16	X	1 ~ 16	X	
MODE	default	X	X	X	3	3	3	3	3	
	messages	X	X	X	X	X	X	X	X	
	altered	X	X	X	X	X	X	X	X	
NOTE NUMBER					1 ~ 127	1 ~ 127	1 ~ 127	1 ~ 127	36 ~ 58	
	true voice	48 ~ 96	36 ~ 84	36 ~ 60	36 ~ 108	36 ~ 108	36 ~ 108	36 ~ 108	36 ~ 58	
VELOCITY	note on	1 ~ 127	1 ~ 127	96	1 ~ 127	1 ~ 127	1 ~ 127	1 ~ 127	1 ~ 127	
	note off	0	0	0	80(H) Vel. 0	80(H) Vel. 0	80(H) Vel. 0	80(H) Vel. 0	80(H) Vel. 0	
AFTER TOUCH	key's	X	X	X	X	X	X	X	X	
	ch's	X	X	X	X	X	X	X	X	
PITCH BENDER		X	X	X	X	X	X	X	X	
CONTROL CHANGE	SUSTAIN ON	64 127	64 127	64 127	64 127	64 127		64 127		
	OFF	64 0	64 0	64 0	64 0	64 0		64 0		
	SOLO BEND ON	65 127			65 127					
	OFF	65 0			65 0					
	FILL-IN ON	68 127			68 127					
	OFF	68 0			68 0					
PROGRAM CHANGE	true no.	X	X	X	X	X	X	X	X	
SYSTEM EXCLUSIVE		○	X	X	○	X	X	X	X	Basic CH 1
SYSTEM COMMON	song position	X	X	X	X	X	X	X	X	
	song select	X	X	X	X	X	X	X	X	
	tune	X	X	X	X	X	X	X	X	
SYSTEM REAL TIME	clock	○ F8(H)			○ F8(H)					F8. FA. FC only
	command	○ FA(H) FC(H)			○ FA(H) FC(H)					
AUX MESSAGES	local on/off	X	X	X	X	X	X	X	X	
	all note off	X	X	X	○	○	○	○	○	(133 ~ 127), 00
	active sense	X	X	X	X	X	X	X	X	
	reset	X	X	X	X	X	X	X	X	
NOTE										

MODE 1 : OMNI ON, POLY   MODE 2 : OMNI ON, MONO
MODE 3 : OMNI OFF, POLY   MODE 4 : OMNI OFF MONO

TROUBLESHOOTING

No arpeggio or accompaniment sound.

- The arpeggio and accompaniment are produced only when the FASCINATING CHORD has been set to "ONE FINGER" or "MULTI FINGER" and the rhythm has been started.

No microphone sound.

- After connecting a microphone or electric musical instrument to the MIC IN jack, it is necessary to adjust the MIC VOL control.

Automatic accompaniment does not stop.

- When the CHORD MEMORY switch is on, the accompaniment continues even after the lower manual keys are released. Press the START/STOP switch to stop the accompaniment.

Automatic accompaniment and rhythm stops automatically.

- When the SYNCHRO START is on and CHORD MEMORY is off, the FASCINATING CHORD and rhythm are played only while lower manual keys are depressed. They stop automatically when the keys are released.

Bass and arpeggio are out of tune with the chord being played.

- When a complex chord is played in the MULTI FINGER mode, the chord sound is produced as fingered but the bass and arpeggio are produced after being processed by the microcomputer, which converts the played chord into one of 14 basic chords and thus they may sometimes differ from the chord actually played.

Sound replayed by COMPUCORDER is different from that recorded.

- As above, sound is recorded in the COMPUCORDER after being processed by the microcomputer. The replayed chord could be different from that intended when recording.

Sound is distorted.

- This sometimes happens when the volume setting on the NS-70 is too high.

ULTRA CHORD does not function.

- ULTRA CHORD functions when an accompaniment chord is played on the lower manual. However, ULTRA CHORD is possible in REPLAY (COMPUCORDER) where the accompaniment is played automatically.

No accompaniment sound.

- Accompaniment sound will not be heard if none of variation switches [1] [2] [3] [4] are pressed (with no LED lit) on the DIGITAL COMPOSER; or if CUSTOM RHYTHM 1 or 2 is selected and there is no accompaniment variation pattern stored in it, or if the VOLUME controls are set to the lowest positions.

Bass sound is too long or short.

- Adjust it using the BASS SUSTAIN knob on the VOLUME controls.

Consumes power when not in use

- This unit consumes power even when the POWER switch is turned off. Be sure to unplug the power cord when the unit is not in use for an extended period of time.

  Note:

  To protect data stored in the CUSTOM COMBINATION MEMORY, be sure to turn the power on once every two weeks.

Power is on, but no sound is heard

- For several seconds after the POWER switch is pressed, sound cannot be produced even if the keys are pressed, since the internal micro-computer first checks all functions automatically.
- Check the setting of the VOLUME slide controls. Sound is not produced when these volume controls are at the lowest positions.

CUSTOM COMBINATION MEMORY switch is on but no sound is heard

- As CUSTOM COMBINATION MEMORY is empty at first, it can only be used after some information has been stored.

Volume balance does not correspond the knob position

- The volume balances for each voice can also be stored in the CUSTOM COMBINATION MEMORY; however, the volume level of the recalled setting may differ from the volume knob position as shown in VOLUME section.

Phaser effect does not function

- Two types of voices are supplied: those with, and those without the phaser effect. By controlling the PHASER SPEED knob, phaser speed can be varied for voices with the Phaser effect.

Reverb effect does not function

- Some voices (bass voices and some of rhythm accomp voices) may not respond with varying reverb levels even through the STEREO REVERB knob is being manipulated. Also, during sound creation, reverb may not be added to a voice even though the STEREO REVERB knob is being manipulated. In this case, change the Reverb parameter of the Effect section to set the amount of reverb to the desired level.

Custom bass does not function

- When the pedal keyboard is not connected, the CUSTOM BASS switch will not function. (This switch sends bass sound to the pedal keys when Fascinating Chord is used.)

LOWER TO UPPER does not function

- When FASCINATING CHORD is used (with the ONE FINGER or MULTI FINGER switch set to ON), the LOWER TO UPPER switch will not function even if the LED is lit.

Lower voices go off when REPLAY is switched on/off.

- When Replay is pressed on or off while pressing one of the lower manual keys, the desired sound may not be produced. In this case, press it again or press the REPLAY switch after releasing the lower manual key.

ULTRA CHORD is switched on but does not function when replaying.

- On replay, the ULTRA CHORD affects the replaying sound when the [Orch] switch on the DIGITAL COMPOSER is on, and affects the voice played by the keyboard when the Melody [1] or [2] is off.

TOUCH RESPONSE does not function on the Lower manual.

- Touch Response does not function when FASCINATING CHORD is used or when replaying, it functions only in the Normal condition.

Sound played on the pedal keyboard is not produced.

- When the (optional NS-P10/20) Pedal Keyboard Unit is not connected, the pedal keyboard sound is not produced even if the NORMAL or CUSTOM BASS LED is lit.

BASS, ACCOMP patterns of the CUSTOM RHYTHM cannot be modified.

- When a pattern is created by continuously pressing one or more lower lower manual keys, the continuous note condition will be stored for one bar. Similarly, if the rest key is pressed while continuously pressing the lower manual keys, only the rest signal will be applied, resulting in one bar of silence.

SPECIFICATIONS

Number of keys	Upper: 49, Lower: 49
Touch Sense	Lower, Upper, Solo
Voices	
Solo/Arpeggio	15 preset + 15 Custom Solo To Arpeggio Solo To Lower Custom Select
Upper	24 preset + 14 Custom Sustain Custom Select
Lower	13 preset + 13 Custom Sustain Lower To Upper Custom Select
Rhythm Accomp	7 preset + 7 Custom Custom Select
Bass	7 preset + 7 Custom Sustain Bass To Lower Custom Select
Volumes	Master Volume, Solo, Upper, Lower, Rhythm Accomp, Bass, Rhythm
Grand Effect	Stereo Reverb, Phaser Speed
Sustain (Level)	Upper, Lower, Bass
Touch Response	Solo, Upper, Lower
Stereo Effect	Symphonic, Celeste
Ultra Chord	Open, Closed
Magic Foot	Intro/fill-in, Solo Bend, Upper Sustain, Start/stop
Custom Combination Memory	1 to 8, Memory Cancel, Effect Memory Cancel
Full PCM Stereo Rhythm	14 presets x 4 Variations 2 Custom x 4 Variations Rhythm Reverb, Manual Drums, Hand Clap, Tambourine Beat Conductor, Rhythm Tempo, Digital Display, Number, Value, Start/Stop, Synchro Start Intro/Fill-in x 4 Variations
Fascinating Chord	Normal, One Finger, Multi Finger Chord Memory, Custom Bass Auto Bass x 4 Variations Auto Accomp x 4 Variations Auto Arpeggio x 4 Variations
Compucorder	Chord Record, Variation Record, Melody Record, Replay
Digital Composer	Compose, Clear, Melody 1/2, Solo, Orchestra (Upper), Each Variation Switch 1 to 4
Sound Creator	Edit, Write, Value Up, Value Down
Connection Terminals	AC IN, Voltage Selector, AUX OUT (L/R), System Out, AUX IN (L/R), EXP IN (L/R), Organ Signal, Expression Pedal, Foot Switch, MIDI IN, MIDI OUT, MIDI THRU, Pedal Keyboard, Organ Remote, Headphone, Microphone
Others	Power Switch, AC Standby LED, Pitch Controls (Solo, Upper, Lower), MIC Volume.
Power supply	AC 120/220/240 V switchable, 50/60 Hz
Weight	30.0 kg
Dimensions	1223(W) x 217(H) x 492(D) mm
Power consumption	32 W
Accessories	Digital Composer (KE-10), AC cord, Owner's Manual, Sound Creator Manual, Stereo Pin Cords

Design and specifications subject to change without notice.

OPTIONS

- NS-M10 Digital Memory Pack
  Custom voices which are made as desired, and the settings stored in the Custom Combination Memory can be stored in this pack.
- KE-10 Digital Composer Pack (One unit is provided with the NS-70)
  Your own play recorded on the Compucorder, and the rhythm or auto-accompaniment patterns which are made and stored in the Custom Rhythm, can be transferred and stored in this pack.
- NS-P10 13-Key Pedal Keyboard Unit
  One-octave pedal keyboard unit for connection to the NS-70.
- NS-P20 25-Key Pedal Keyboard Unit
  Two-octave pedal keyboard unit with matching bench, for use with the NS-70.
- NS-B20 Exclusive Bench for the NS-Series System Keyboard.
- NS-S10 Exclusive Stand for NS-Series System Keyboard.
- NS-T90 Full-Coupler Organ Expander Unit.
  By combining 9 digital drawbars a more authentic organ sound is obtained.
  The remote control unit included in this set can be placed on the side top panel of the NS-70.

System Keyboard NS-70

CONTROL PANEL
BEDIENUNGSKONSOLE

RHYTHM TEMPO & DISPLAY
Speed up the rhythm by turning the RHYTHM TEMPO control clockwise. The speed is indicated digitally (♩ =) on the display to the left of it.

RHYTHMUS-TEMPOREGLER/-ANZEIGE
Das Tempo wird durch Drehen am RHYTHM TEMPO-Regler verändert. Das Tempo wird digital (♩ =) auf der Anzeige links daneben angegeben.

BEAT CONDUCTOR
The rhythm tempo setting is indicated by the lighting of LEDs even when rhythm is not running.

METRONOM
Das Tempo des Rhythmus wird durch blinkende LED-Anzeigen angegeben, selbst wenn die Rhythmusbegleitung noch nicht aktiviert ist.

SOUND CREATOR
Preset voices can be re-arranged, and new voices can be created and stored as custom voices.
To create a new coice, refer to the section of the "SOUND CREATOR" manual called "Sound Editing".
(Note: For a better understanding of synthesizer, see "The Joy of Synthesizing".)

KLANGPROGRAMMIERER
Die festprogrammierten Instrumentstimmen (Presets) können damit geändert und als freiprogrammierte (Custom) Instrumentstimmen gespeichert werden.
Um eine neue Instrumentstimme frei zu programmieren, siehe Abschnitt "SOUND CREATOR" (Klangprogrammierer) der separaten Anleitung.
(Hinweis: Zum besseren Verständnis der Funktionsweise eines Synthesizers siehe Abschnitt "Spaß mit dem Synthesizer".)

DIGITAL COMPOSER
This slot accepts a DIGITAL COMPOSER pack (provided); a DIGITAL MEMORY pack (optional), in which original voices created using the SOUND CREATOR and settings stored in the CUSTOM COMBINATION MEMORY can be stored; and a VOICE PACK (optional) that permits the user to use new voices created by professional musicians.
Use the DIGITAL COMPOSER when playing.

Dieser Schacht ist für den Einsatz a) einer DIGITAL COMPOSER Einheit (mitgeliefert), b) einer DIGITAL MEMORY-Einheit (Sonderzubehör) für die Speicherung der mit dem SOUND CREATOR programmierten Instrumentstimmen und der CUSTOM COMBINATION MEMORY Eingaben und c) der VOICE PACK-Einheit (Sonderzubehör) für die Verwendung der von professionellen Musikern programmierten Instrumentstimmen vorgesehen.
Den DIGITAL COMPOSER beim Spielen verwenden.

ARPEGGIO variation switches
ARPEGGIO-Variationsschalter
RHYTHM ACCOMP variation switches
RHYTHM ACCOMP Variationsschalter
BASS variation switches
BASS-Variationsschalter
RHYTHM variation switches
RHYTHM-Variationsschalter
INTRO/FILL IN variation switches
INTRO/FILL IN-Variationsschalter

FASCINATING CHORD (AUTOMATIC ACCOMPANIMENT)
Using a micro-computer, this unique automatic accompaniment function permits users to play full accompaniment with only one finger. (Refer to the Owner's Manual, page 5.)

FASCINATING CHORD (AUTOMATISCHE BEGLEITUNG)
Auf Grund des Mikrocomputers ermöglicht die einzigartige automatische Begleitfunktion das Spielen einer kompletten Begleitung mit nur einem Finger. (Siehe Seite 25 der Bedienungsanleitung.)

NORMAL
The FASCINATING CHORD is deactivated.

Damit wird die automatische Begleitung ausgeschaltet.

ONE FINGER
Automatic accompaniment mode for those who can play a complete chord with the left hand.

Betriebsart der automatischen Begleitung für Spieler, die mit der linken Hand keine vollständigen Akkorde anschlagen können.

MULTI FINGER
Automatic accompaniment mode for those who can play full, left hand chords.

Betriebsart der automatischen Begleitung für Spieler, die Akkorde mit der linken und rechten Hand spielen können.

CHORD MEMORY
The same accompaniment is repeated even after the lower manual keys are released, until new keys are pressed.

Die gleiche Begleitung wird auch nach Freigeben der Tasten auf dem unteren Manaul wiederholt, bis neue Tasten angeschlagen werden.

CUSTOM BASS
Even in automatic accompaniment, Bass can be played manually on the lower manual when this switch is ON.

Selbst bei der automatischen Begleitung kann die Baßstimme nach Drücken dieser Taste auf dem unteren Manual frei von Hand gespielt werden.

FULL PCM STEREO RHYTHM
14 rhythms x 4 variations = 56 rhythm patterns are preset. 16 percussion sounds are PCM digitally recorded from real instruments and arranged in stereo.

FULL PCM STEREO RHYTHMUS
14 Rhythmen x 4 Variationen = 56 festprogrammierte Rhythmusmuster. 16 Percussion Instrumente wurden digital durch Pulscodemodulation (PCM) aufgezeichnet und in den Registern in Stereo angeordnet.

RHYTHM REVERB
Reverb can be given to snare drum, hand clap and rim shot percussion sounds.

RHYTHMUSHALL
Snare-Drum, Händeklatschen und Randschlag kann ein Halleffekt angefügt werden.

MANUAL DRUMS
Percussion instruments can be played manually on the left two octaves of the lower manual.
The assignment of percussion instruments is shown in the illustration on the Owner's Manual page 11.

MANUELLER RHYTHMUS
Die Percussion-Instrumente können durch Anschlagen von den Tasten der zwei tiefsten Oktaven auf dem unteren Manual manuell gespielt werden.
Die Zuweisung der Percussion-Instrumente ist in der Abbildung auf Seite 31 der Bedienungsanleitung aufgezeigt.

HANDCLAP/TAMBOURINE
Either handclaps or tambourine can be added to the rhythm percussion.

HÄNDEKLATSCHEN/TAMBURIN
Es kann zwischen Händeklatschen und Tamburin für das Rhythmusspiel gewählt werden.

CUSTOM RHYTHM 1/2 (8 patterns = 2 tracks x 4 variations)
Rhythm, intro/fill-in, bass, accompaniment, and arpeggio patterns made with the DIGITAL COMPOSER can be stored here to be recalled by pressing these switches. (See Owner's Manual page 11.)

CUSTOM-RHYTHMUS 1/2 (8 Muster = 2 Spuren x 4 Variationen)
Die mit dem DIGITAL COMPOSER eingegebenen Rhythmus-, Vor/Zwischenspiel-, Begleitungs- und Arpeggiomuster können hier gespeichert und auf Knopfdruck abgerufen werden. (Siehe Seite 31 der Bedienungsanleitung)

SUSTAIN (control knob)
The sustain lengths of the UPPER, LOWER and BASS voices can be varied when the corresponding SUSTAIN switches are ON.
(Normally, set to the center position.)

ABKLINGNACHHALL (Regler)
Die Länge des Abklingnachhalls kann für die Instrumentstimmen der Register des oberen und unteren Manuals (UPPER und LOWER) sowie für die Baßregister variiert werden, wenn die betreffenden SUSTAIN-Schalter gedrückt (ON) sind. (Normalerweise ded Abklingnachhall auf den Mittelwert einstellen).

SUSTAIN (ON/OFF)
Sustain can be switched ON/OFF by this switch and its level adjusted by the SUSTAIN slide control.

ABKLINGNACHHALL (EIN/AUS)
Durch diesen Schalter kann der Abklingnachhaleffekt ein/ausgeschaltet werden. Die Länge des SUSTAIN kann mit dem SUSTAIN-Regler festgelegt werden.

VOLUME
The volumes of the sounds of the NS-70, grouped into 6 channels, are controlled so that their balance can be checked at a glance.

LAUTSTÄRKE
Die Lautstärken der Instrumentstimmen des NS-70 sind in sechs Kanäle gruppiert, wodurch sie sich aufeinander abstimmen lassen und ihr Verhältnis mit einem Blick erfaßt werden kann.

PHASER SPEED
Vary the rate of phasing added to
voices selected contain phase eff
varied. Normally set to the center
containing the phaser effect, see O

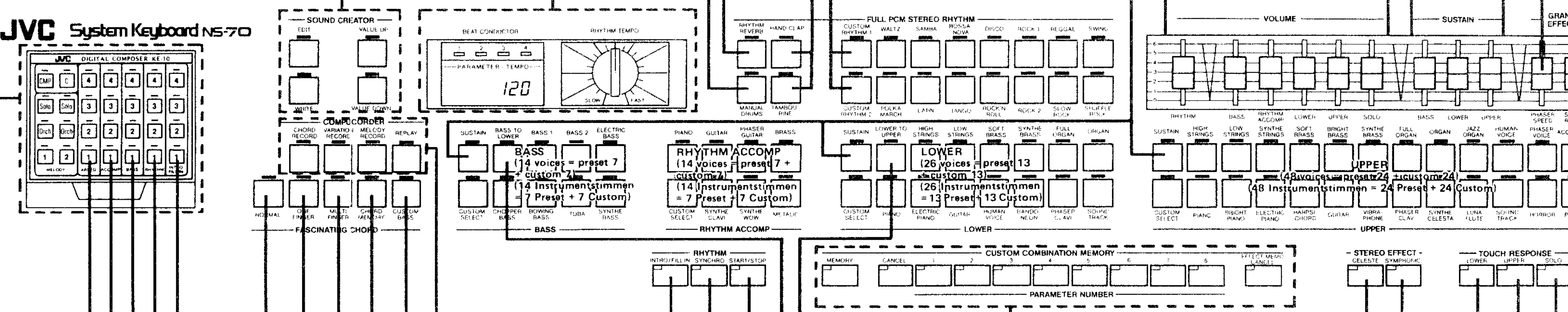
PHASER-GESCHWINDIGKEIT
Mit diesem Regler wird der Wirku
effekt auf die Instrumentstimmen,
können, variiert. Die Phasenvers
Normalerweise auf die Mittelposi
strumentstimmen, die auf den P
sich auf 23 der Bedienungsanleitun

STEREO REVERB
Reverb can be added to different
optimum balance. Use this contr
depth. (Normally, set to the center

STEREO-HALL
Den verschiedenen Instrumentsti
Grad von Echohall angefügtwerde
erhalten. Verwenden Sie diesen
Raumeffekt zu geben. (Normalerw

MASTER VOLUME
Use this control to adjust the overa

GESAMTLAUTSTÄRKE
Dieser Regler dient zum Einstellen


JVC System Keyboard NS-70
JVC DIGITAL COMPOSER KE-10
CMP
C
Solo
Orch
MELODY
ARPEG
ACCOMP
BASS
RHYTHM
INTRO FILL IN
SOUND CREATOR
EDIT
VALUE UP
WRITE
VALUE DOWN
BEAT CONDUCTOR
RHYTHM TEMPO
PARAMETER · TEMPO
120
SLOW
FAST
COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY
NORMAL
ONE FINGER
MULTI FINGER
CHORD MEMORY
CUSTOM BASS
FASCINATING CHORD
RHYTHM REVERB
HAND CLAP
MANUAL DRUMS
TAMBOURINE
FULL PCM STEREO RHYTHM
CUSTOM RHYTHM 1
WALTZ
SAMBA
BOSSA NOVA
DISCO
ROCK 1
REGGAE
SWING
CUSTOM RHYTHM 2
POLKA MARCH
LATIN
TANGO
ROCK'N ROLL
ROCK 2
SLOW ROCK
SHUFFLE ROCK
SUSTAIN
BASS TO LOWER
BASS 1
BASS 2
ELECTRIC BASS
CUSTOM SELECT
CHOPPER BASS
BOWING BASS
TUBA
SYNTHE BASS
BASS
BASS (14 voices = preset 7 + custom 7) (14 Instrumentstimmen = 7 Preset + 7 Custom)
PIANO
GUITAR
PHASER GUITAR
BRASS
CUSTOM SELECT
SYNTHE CLAVI
SYNTHE WOW
METALIC
RHYTHM ACCOMP
RHYTHM ACCOMP (14 voices = preset 7 + custom 7) (14 Instrumentstimmen = 7 Preset + 7 Custom)
SUSTAIN
LOWER TO UPPER
HIGH STRINGS
LOW STRINGS
SOFT BRASS
SYNTHE BRASS
FULL ORGAN
ORGAN
CUSTOM SELECT
PIANO
ELECTRIC PIANO
GUITAR
HUMAN VOICE
BANDO NEON
PHASER CLAVI
SOUND TRACK
LOWER
LOWER (26 voices = preset 13 + custom 13) (26 Instrumentstimmen = 13 Preset + 13 Custom)
VOLUME
SUSTAIN
GRAN EFFE
RHYTHM
BASS
RHYTHM ACCOMP
LOWER
UPPER
SOLO
BASS
LOWER
UPPER
PHASER SPEED
SUSTAIN
HIGH STRINGS
LOW STRINGS
SYNTHE STRINGS
SOFT BRASS
BRIGHT BRASS
SYNTHE BRASS
FULL ORGAN
ORGAN
JAZZ ORGAN
HUMAN VOICE
PHASER VOICE
CUSTOM SELECT
PIANO
BRIGHT PIANO
ELECTRIC PIANO
HARPSI CHORD
GUITAR
VIBRA PHONE
PHASER CLAV
SYNTHE CELESTA
LUNA FLUTE
SOUND TRACK
HORROR
UPPER
UPPER (48 voices = preset 24 + custom 24) (48 Instrumentstimmen = 24 Preset + 24 Custom)
RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP
CUSTOM COMBINATION MEMORY
MEMORY
CANCEL
1
2
3
4
5
6
7
8
EFFECT MEMO CANCEL
PARAMETER NUMBER
STEREO EFFECT
CELESTE
SYMPHONIC
TOUCH RESPONSE
LOWER
UPPER
SOLO

CUSTOM COMBINATION MEMORY (See Owner's Manual page 4.)
Switch settings of the SOLO/UPPER/LOWER/RHYTHM ACCOMP/BASS voices, volume balance, ULTRA CHORD, MAGIC FOOT, STEREO EFFECTS and TOUCH RESPONSE can be stored in memory. Up to 8 different settings can be stored and recalled by one-touch operation.

CUSTOM KOMBINATIONSSPEICHER (Siehe Seite 24 der Bedienungsanleitung.)
Schaltereinstellungen für SOLO/UPPER/LOWER/RHYTHM ACCOMP/BASS-Instrumentstimmen, Lautstärkebalance, ULTRA CHORD, MAGIC FOOT, STEREO EFFECTS und TOUCH RESPONSE können in diesen Speicher einprogrammiert werden. Bis zu acht verschiedene Einstellungen können eingespeichert und auf Knopfdruck abgerufen werden.

COMPUCORDER
(Multi-Track Digital Recorder)
Chord progression, melody (monophonic melody x 2 or two-note melody x 1), accompaniment and intro/fil-in variations can be recorded using the automatic accompaniment functions. (See Owner's Manual page 7.)

COMPUCORDER
(Mehrspur-Digitalrekorder)
Akkordfolge, Melodie (monophone Melodien x 2 oder 2-notige Melodie x 1), Begleitungs- und Intro/Fill-in-Variationen können bei Verwendung der automatischen Begleitfunktion aufgezeichnet werden. (Siehe Seite 27 der Bedienungsanleitung.)

LOWER TO UPPER
Lower voices can be played on the upper manual.

INSTRUMENTSTIMMEN UNTERES MANUAL FÜR OBERES MANUAL
Damit können die Instrumentstimmen des unteren Manuals dem oberen zugewiesen werden.

BASS TO LOWER
Bass voices can be played on the left two octaves of the lower manual.

BASS FÜR UNTERES MANUAL
Die Baßstimmen können auf den tiefsten zwei Oktaven des unteren Manuals gespielt werden.

RHYTHM

START/STOP
Press to start or stop the selected rhythm.

Drücken, um den gewählten Rhythmus zu starten oder zu stoppen.

SYNCHRO START
Rhythm starts when one of the lower manual keys is pressed.

Das Rhythmusspiel setzt mit dem Anschlag einer Taste auf dem unteren Manual ein.

INTRO/FILL IN
Press to start rhythm with an introduction or to insert a rhythm break in the middle of playing.

Drücken, wenn der Rhythmus mit einem Vorspiel beginnen soll, oder um einen Break in das Spiel einzufügen.

STEREO E
SYMPHON
CELESTE
Two types
musical en
CELESTE,
PHONIC,
enhancing

STEREO-E
SYMPHON
Zwei Stere
des Klang
Klang des
sameres G
fekte gewä
und beton

M
›6 rhythm patterns are preset. 16 percussion sounds are PCM digitally recorded from real instru-

MUS
= 56 festprogrammierte Rhythmusmuster. 16 Percussion Instrumente wurden digital durch Puls-
ichnet und in den Registern in Stereo angeordnet.

drum, hand clap and rim

und Randschlag kann

layed manually on the left
l.
ıstruments is shown in the
ual page 11.

nen durch Anschlagen von
Oktaven auf dem unteren

n-Instrumente ist in der
ınungsanleitung aufgezeigt.

HANDCLAP/TAMBOURINE
Either handclaps or tambourine can be added to the rhythm percussion.

HÄNDEKLATSCHEN/TAMBURIN
Es kann zwischen Händeklatschen und Tamburin für das Rhythmusspiel gewählt werden.

CUSTOM RHYTHM 1/2 (8 patterns = 2 tracks x 4 variations)
Rhythm, intro/fill-in, bass, accompaniment, and arpeggio patterns made with the DIGITAL COMPOSER can be stored here to be recalled by pressing these switches. (See Owner's Manual page 11.)

CUSTOM-RHYTHMUS 1/2 (8 Muster = 2 Spuren x 4 Variationen)
Die mit dem DIGITAL COMPOSER eingegebenen Rhythmus-, Vor/Zwischenspiel-, Begleitungs- und Arpeggiomuster können hier gespeichert und auf Knopfdruck abgerufen werden. (Siehe Seite 31 der Bedienungsanleitung)

SUSTAIN (control knob)
The sustain lengths of the UPPER, LOWER and BASS voices can be varied when the corresponding SUSTAIN switches are ON.
(Normally, set to the center position.)

ABKLINGNACHHALL (Regler)
Die Länge des Abklingnachhalls kann für die Instrumentstimmen der Register des oberen und unteren Manuals (UPPER und LOWER) sowie für die Baßregister variiert werden, wenn die betreffenden SUSTAIN-Schalter gedrückt (ON) sind. (Normalerweise ded Abklingnachhall auf den Mittelwert einstellen).

SUSTAIN (ON/OFF)
Sustain can be switched ON/OFF by this switch and its level adjusted by the SUSTAIN slide control.

ABKLINGNACHHALL (EIN/AUS)
Durch diesen Schalter kann der Abklingnachhaleffekt ein/ausgeschaltet werden. Die Länge des SUSTAIN kann mit dem SUSTAIN-Regler festgelegt werden.

VOLUME
The volumes of the sounds of the NS-70, grouped into 6 channels, are controlled so that their balance can be checked at a glance.

LAUTSTÄRKE
Die Lautstärken der Instrumentstimmen des NS-70 sind in sechs Kanäle gruppiert, wodurch sie sich aufeinander abstimmen lassen und ihr Verhältnis mit einem Blick erfaßt werden kann.

PHASER SPEED
Vary the rate of phasing added to keyboard voices. When keyboard voices selected contain phase effect, the rate of phasing can be varied. Normally set to the center position. (For a list of the voices containing the phaser effect, see Owner's Manual page 3.)

PHASER-GESCHWINDIGKEIT
Mit diesem Regler wird der Wirkungsgrad des Phasenverschiebungseffekt auf die Instrumentstimmen, die auf diesen Effekt an sprechen können, variiert. Die Phasenverschiebung wird damit verändert. Normalerweise auf die Mittelposition gestellt. (Die Liste der Instrumentstimmen, die auf den Phasereffekt ansprechen, befindet sich auf 23 der Bedienungsanleitung).

STEREO REVERB
Reverb can be added to different voices to different degrees for an optimum balance. Use this control to adjust the total feeling of depth. (Normally, set to the center position.)

STEREO-HALL
Den verschiedenen Instrumentstimmen kann ein unterschiedlicher Grad von Echohall angefügtwerden, um ein optimales Klangbild zu erhalten. Verwenden Sie diesen Regler, um dem Klangbild einen Raumeffekt zu geben. (Normalerweise auf Mittelposition ein stellen).

MASTER VOLUME
Use this control to adjust the overall volume of the NS-70.

GESAMTLAUTSTÄRKE
Dieser Regler dient zum Einstellen der Gesamtlautstärke des NS-70.

ULTRA CHORD
Harmony corresponding to the chord being played by the automatic accompaniment is added to the single-note melody played on the upper manual. Two types of harmonies are provided.
① **CLOSED:** Harmonies within one octave, like block play of piano or organ.
② **OPEN:** Harmonies extending over one octave, like those arranged for big bands.

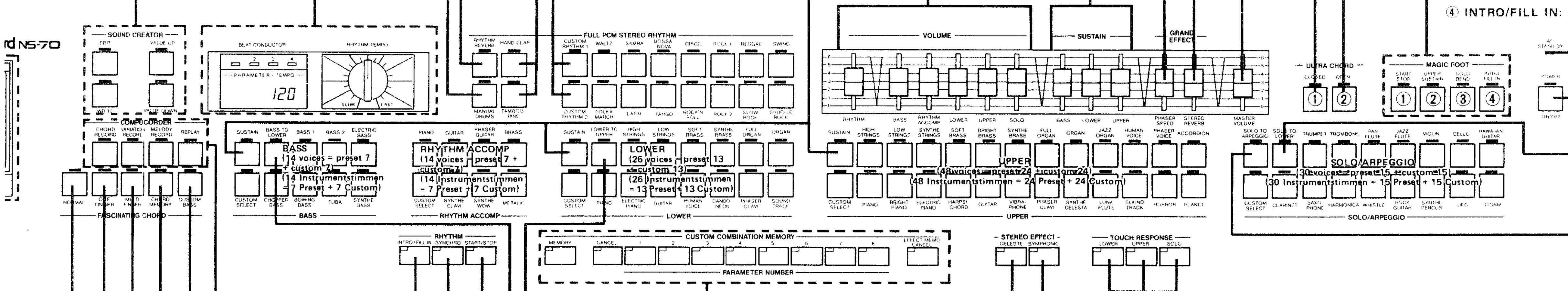
ULTRA-AKKORD
Die Harmonische wird entsprechend dem Begleitakkord der monophonen, auf dem oberen Manual gespielten, Melodie hinzugefügt. Zwei Arten von Harmonischen stehen zur Verfügung:
① **ENG:** Die Harmonische liegt innerhalb der gleichen Oktave, wodurch sich ein Effekt wie beim Blockspiel auf Klavier oder Orgel einstellt.
② **WEIT:** Das harmonische Äquivalent wird einem über eine Oktave hinausgehenden Bereich entnommen, wodurch sich ein Effekt wie bei Big-Bands erzielen läßt.

MAGIC FOOT
When the footswtich (provided) or pedal key unit (optional) is used, the following functions can be switched ON/OFF by foot. (For connection, see Owner's Manual page 16.)

① **START/STOP:**	Rhythm start or stop.
② **UPPER SUSTAIN:**	Depress switch for Upper voice sustain.
③ **SOLO BEND:**	Depress switch for half-step Solo voice pitch bending.
④ **INTRO/FILL IN:**	Rhythm intro/fill-in ON.

FUSSREGLER
Wenn der mitgelieferte Fußschalter oder der Schweller (Sonderzubehör) verwendet werden, lassen sich folgende Funktionen mit dem Fuß steuern. (Sie Seite 36 der Bedienungsanleitung.)

① **START/STOP:**	Start und Stop des Rhythmus
② **UPPER SUSTAIN:**	Drücken, um der Instrumentstimme des oberen Manuals einen Abklingnachhalleffekt anzufügen.
③ **SOLO BEND:**	Durch Drücken erfolgt bei monophonen Solo-Instrumentstimmen eine Tonhöhenänderung in Halbtonschritten.
④ **INTRO/FILL IN:**	Damit wird das Vor-/Zwischenspiel eingeschaltet.


rd NS-70
SOUND CREATOR
EDIT
VALUE UP
WRITE
VALUE DOWN
BEAT CONDUCTOR
PARAMETER · TEMPO
120
RHYTHM TEMPO
SLOW
FAST
COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY
NORMAL
ONE FINGER
MULTI FINGER
CHORD MEMORY
CUSTOM BASS
FASCINATING CHORD
RHYTHM REVERB
HAND CLAP
MANUAL DRUMS
TAMBOURINE
FULL PCM STEREO RHYTHM
CUSTOM RHYTHM 1
WALTZ
SAMBA
BOSSA NOVA
DISCO
ROCK 1
REGGAE
SWING
CUSTOM RHYTHM 2
POLKA MARCH
LATIN
TANGO
ROCK'N ROLL
ROCK 2
SLOW ROCK
SHUFFLE ROCK
SUSTAIN
BASS TO LOWER
BASS 1
BASS 2
ELECTRIC BASS
CUSTOM SELECT
CHOPPER BASS
BOWING BASS
TUBA
SYNTHE BASS
BASS
BASS
(14 voices = preset 7 + custom 7)
(14 Instrumentstimmen = 7 Preset + 7 Custom)
PIANO
GUITAR
PHASER GUITAR
BRASS
CUSTOM SELECT
SYNTHE CLAVI
SYNTHE WOW
METALIC
RHYTHM ACCOMP
RHYTHM ACCOMP
(14 voices = preset 7 + custom 7)
(14 Instrumentstimmen = 7 Preset + 7 Custom)
SUSTAIN
LOWER TO UPPER
HIGH STRINGS
LOW STRINGS
SOFT BRASS
SYNTHE BRASS
FULL ORGAN
ORGAN
CUSTOM SELECT
PIANO
ELECTRIC PIANO
GUITAR
HUMAN VOICE
BANDONEON
PHASER CLAVI
SOUND TRACK
LOWER
LOWER
(26 voices = preset 13 + custom 13)
(26 Instrumentstimmen = 13 Preset + 13 Custom)
VOLUME
SUSTAIN
GRAND EFFECT
RHYTHM
BASS
RHYTHM ACCOMP
LOWER
UPPER
SOLO
BASS
LOWER
UPPER
PHASER SPEED
STEREO REVERB
MASTER VOLUME
SUSTAIN
HIGH STRINGS
LOW STRINGS
SYNTHE STRINGS
SOFT BRASS
BRIGHT BRASS
SYNTHE BRASS
FULL ORGAN
ORGAN
JAZZ ORGAN
HUMAN VOICE
PHASER VOICE
ACCORDION
CUSTOM SELECT
PIANO
BRIGHT PIANO
ELECTRIC PIANO
HARPSICHORD
GUITAR
VIBRAPHONE
PHASER CLAVI
SYNTHE CELESTA
LUNA FLUTE
SOUND TRACK
HORROR
PLANET
UPPER
UPPER
(48 voices = preset 24 + custom 24)
(48 Instrumentstimmen = 24 Preset + 24 Custom)
ULTRA CHORD
CLOSED
OPEN
MAGIC FOOT
START STOP
UPPER SUSTAIN
SOLO BEND
INTRO FILL IN
AC STAND BY
POWER
ON/OFF
SOLO TO ARPEGGIO
SOLO TO LOWER
TRUMPET
TROMBONE
PAN FLUTE
JAZZ FLUTE
VIOLIN
CELLO
HAWAIIAN GUITAR
CUSTOM SELECT
CLARINET
SAXOPHONE
HARMONICA
WHISTLE
ROCK GUITAR
SYNTHE PERCUS
UFO
STORM
SOLO/ARPEGGIO
SOLO/ARPEGGIO
(30 voices = preset 15 + custom 15)
(30 Instrumentstimmen = 15 Preset + 15 Custom)
RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP
CUSTOM COMBINATION MEMORY
MEMORY
CANCEL
1
2
3
4
5
6
7
8
EFFECT MEMO CANCEL
PARAMETER NUMBER
STEREO EFFECT
CELESTE
SYMPHONIC
TOUCH RESPONSE
LOWER
UPPER
SOLO

AC STANDBY LAMP
BETRIEBSBEREITSCHAFTS-ANZEIGE

POWER SWITCH
NETZSCHALTER

SOLO TO LOWER
Solo voices, usually played on the upper manual, can be played on the lower manual. However, this function is defeated when the FASCINATING CHORD is used, or during COMPUCORDER REPLAY even if the SOLO TO LOWER LED is lit.

SOLO FÜR UNTERES MANUAL
Die normalerweise auf dem oberen Manual zu spielenden Solo-Stimmen können auch auf dem unteren Manual gespielt werden. Diese Funktion ist jedoch nicht bei Verwendung des FASCINATING CHORD oder bei COMPUCORDER REPLAY verfügbar, auch wenn die SOLO TO LOWER-LED leuchtet.

SOLO TO ARPEGGIO
Solo voices can be used to play arpeggios.

SOLO FÜR ARPEGGIOSPIEL
Damit können Solostimmen mit Arpeggio gespielt werden.

ı werden.

ıd gespielt werden.

COMPUCORDER
(Multi-Track Digital Recorder)
Chord progression, melody (monophonic melody x 2 or two-note melody x 1), accompaniment and intro/fil-in variations can be recorded using the automatic accompaniment functions. (See Owner's Manual page 7.)

COMPUCORDER
(Mehrspur-Digitalrekorder)
Akkordfolge, Melodie (monophone Melodien x 2 oder 2-notige Melodie x 1), Begleitungs- und Intro/Fill-in-Variationen können bei Verwendung der automatischen Begleitfunktion aufgezeichnet werden. (Siehe Seite 27 der Bedienungsanleitung.)

CUSTOM COMBINATION MEMORY (See Owner's Manual page 4.)
Switch settings of the SOLO/UPPER/LOWER/RHYTHM ACCOMP/BASS voices, volume balance, ULTRA CHORD, MAGIC FOOT, STEREO EFFECTS and TOUCH RESPONSE can be stored in memory. Up to 8 different settings can be stored and recalled by one-touch operation.

CUSTOM KOMBINATIONSSPEICHER (Siehe Seite 24 der Bedienungsanleitung.)
Schaltereinstellungen für SOLO/UPPER/LOWER/RHYTHM ACCOMP/BASS-Instrumentstimmen, Lautstärkebalance, ULTRA CHORD, MAGIC FOOT, STEREO EFFECTS und TOUCH RESPONSE können in diesen Speicher einprogrammiert werden. Bis zu acht verschiedene Einstellungen können eingespeichert und auf Knopfdruck abgerufen werden.

LOWER TO UPPER
Lower voices can be played on the upper manual.

INSTRUMENTSTIMMEN UNTERES MANUAL FÜR OBERES MANUAL
Damit können die Instrumentstimmen des unteren Manuals dem oberen zugewiesen werden.

BASS TO LOWER
Bass voices can be played on the left two octaves of the lower manual.

BASS FÜR UNTERES MANUAL
Die Baßstimmen können auf den tiefsten zwei Oktaven des unteren Manuals gespielt werden.

RHYTHM

START/STOP
Press to start or stop the selected rhythm.

Drücken, um den gewählten Rhythmus zu starten oder zu stoppen.

SYNCHRO START
Rhythm starts when one of the lower manual keys is pressed.

Das Rhythmusspiel setzt mit dem Anschlag einer Taste auf dem unteren Manual ein.

INTRO/FILL IN
Press to start rhythm with an introduction or to insert a rhythm break in the middle of playing.

Drücken, wenn der Rhythmus mit einem Vorspiel beginnen soll, oder um einen Break in das Spiel einzufügen.

TOUCH RESPONSE
Volume and timbre can be varied depending on the force with which the keys are hit: detailed expression and play are possible. This function can be switched ON/OFF separately for SOLO, UPPER and LOWER voices.

ANSCHLAGSDYNAMIK
Lauststärke und Klang ändern sich entsprechend der Härte des Anschlags. Damit ist ein wesentlich nuancierteres Keyboardspiel möglich. Diese Funktion kann für die SOLO, UPPER und LOWER-Instrumentstimmen getrennt ein-/ausgeschaltet werden.

STEREO EFFECTS
SYMPHONIC
CELESTE
Two types of stereo effects can be added for musical embellishment. The swirling sound of CELESTE, and its slower counterpart SYMPHONIC, make grater expression possible by enhancing the stereophonic sound image.

STEREO-EFFEKTE
SYMPHONIC/CELESTE
Zwei Stereo-Effekte stehen für die Erzeugung des Klangbilds zur Verfügung. Der wirbelnde Klang des CELESTE-Effekts und sein langsameres Gegenstück, SYMPHONIC. Diese Effekte gewähren größere Ausdrucksmöglichkeiten und betonen das Stereo-Klangbild.

PRESET/CUSTOM VOICES
Preset and custom; two kinds of voices are available. (See Owner's Manual page 2.)
Custom voices can be selected by pressing the CUSTOM SELECT switches.

To recall the custom voice, refer to the separate volume "Sound Creator" page 14. Custom Voice data will be lost if the NS-70's power is off for more than two weeks. To prevent this, store the data into the DIGITAL MEMORY pack (optional) or CUSTOM COMBINATION MEMORY, or be sure to turn the NS-70's power on at least once every two weeks.

FEST- UND FREIPROGRAMMIERTE INSTRUMENTSTIMMEN
Preset (festprogrammiert) und Custom (freiprogrammiert) sind die zwei Arten der verfügbaren Instrumentstimmen. (Siehe Seite 22 der Bedienungsanleitung.)
Freiprogrammierte Instrumentstimmen können nach Drücken des CUSTOM SELECT-Schalters abgerufen werden.

Zur Abrufung der freiprogrammierten Instrumentstimme siehe die separate Beilage "SOUND CREATOR" Seite 32.
Die freiprogrammierte Instrumentstimme wird gelöscht, wenn die Spannungsversorgung des NS-70 für mehr als zwei Wochen nicht eingeschaltet wird. Um dies zu vermeiden, die Daten im DIGITAL MEMORY (Sonderzubehör) oder im CUSTOM COMBINATION MEMORY speichern, bzw. das NS-70 einmal innerhalb von zwei Wochen einschalten.

System Keyboard NS-70

PANNEAU DES COMMANDES
PANEL DE CONTROL

TEMPO DE RYTHME ET AFFICHAGE
Accélérer le rythme en tournant la commande RHYTHM TEMPO dans le sens des aiguilles d'une montre. La vitesse est indiquée numériquement (𝅗𝅥=) à l'affichage, sur sa gauche.

INDICADOR Y TEMPO DEL RITMO
Acelere el ritmo girando el control RHYTHM TEMPO hacia la derecha. La velocidad es indicada digitalmente (𝅗𝅥=) en la presentación visual a la izquierda del control.

CONDUCTEUR DE MESURE
Le réglage du tempo rythmique est indiqué par l'allumage des diodes LED, même quand le rythme de défile pas.

CONDUCTOR DE COMPASES
El ajuste del tempo del ritmo es indicado por la iluminación de los LED, aun cuando el ritmo no esté funcionando.

CREATEUR DE SONS
Les voix préréglées peuvent être réarrangées ou de nouvelles voix peuvent être créées et mémorisées comme voix de l'utilisateur.
Pour créer une nouvelle voix, se reporter à la section de "Créateur de sons" (le manuel) appelée "Montage".
(Remarque: Pour une meilleure compréhension du synthétiseur, voir "Synthétiser dans la joie".)

CREADOR DE SONIDOS
Los sonidos preajustados pueden volver a arreglarse o pueden crearse nuevos sonidos y memorizarse como sonidos del intérprete.
Para crear un nuevo sonido, refiérase a la sección del "CREADOR DE SONIDOS" llamada "Montaje de sonidos".
(Nota: Para un mejor entendimiento del sintetizador, consulte "El encanto de la sintetización".)

COMPOSEUR NUMERIQUE
Cet orifice accepte un DIGITAL COMPOSER (fourni); une DIGITAL MEMORY (optionnelle), où la voix originelle créée par le SOUND CREATOR et le réglage stocké dans la CUSTOM COMBINATION MEMORY peuvent être mémorisés; et un VOICE PACK (optionnel) qui permet à l'utilisateur d'utiliser de nouvelles voix créées par des musiciens professionnels.
Utiliser le DIGITAL COMPOSER en jouant.

COMPOSITOR DIGITAL
Esta ranura acepta un DIGITAL COMPOSER (suministrado); un DIGITAL MEMORY (opcional), en el cual puede almacenarse el sonido original creado con el SOUND CREATOR y el ajuste memorizado en la CUSTOM COMBINATION MEMORY; y un VOICE PACK (opcional) que permite al usuario utilizar nuevos sonidos creados por músicos profesionales.
Utilice el DIGITAL COMPOSER cuando ejecuta.

Commutateurs de variation d'arpèges
Conmutadores de variación de arpegios
Commutateur de variation d'accompagnement rythmique
Conmutadores de variación de acompañamiento rítmico
Commutateurs de variation des basses
Conmutadores de variación de graves
Commutateurs de variation de rythme
Conmutadores de variación de ritmo
Commutateurs de variation d'introduction/remplissage
Conmutadores de variación de introducción/relleno

FASCINATING CHORD (ACCOMPAGNEMENT AUTOMATIQUE)
Utilisant un micro-ordinateur, cette fonction d'accompagnement automatique unique en son genre permet à l'utilisateur de jouer un accompagnement complet avec un doigt. (Se reporter à la page 45.)

FASCINATING CHORD (ACCOMPAÑAMIENTO AUTOMATICO)
Utilizando una microcomputadora, esta función de acompañamiento automático única permite al usuario ejecutar un acompañamiento completo con un dedo. (Refiérase a la página 65.)

NORMAL
Le FASCINATING CHORD n'est pas activé.
El FASCINATING CHORD está desactivado.

ONE FINGER
Mode d'accompagnement automatique pour les personnes ne sachant pas jouer des accords complets de la main gauche.
Acompañamiento automático para aquéllos que pueden ejecutar un acorde completo con la mano izquierda.

MULTI FINGER
Mode d'accompagnement automatique pour les personnes pouvant jouer des accords complets de la main gauche.
Modo de acompañamiento automático para aquéllos que pueden ejecutar acordes con la mano izquierda.

CHORD MEMORY
Le même accompagnement est répété même après que les touches du manuel inférieur sont relâchées, jusqu'à ce que de nouvelles touches soient pressées.
El mismo acompañamiento se repite aun después de soltar las teclas del manual de acompañamiento, hasta que se presionen otras teclas.

CUSTOM BASS
Même en accompagnement automatique, des basses peuvent être jouées manuellement sur le manuel inférieur quand ce commutateur est sur ON.
Aun durante el acompañamiento automático, los graves pueden ejecutarse manualmente en el teclado de acompañamiento cuando este conmutador está en ON.

RYTHME STEREO PCM COMPLETE
14 rythmes x 4 variations = 56 formes de rythme sont préréglées. 16 sons de percussion sont enregistrés numériquement en PCM d'instruments et arrangés en stéréo.

RITMOS ESTEREO CON MODULACION POR CODIFICACION DE IMPULSOS
14 ritmos x 4 variaciones = 56 modelos rítmicos preajustados. 16 sonidos de percusión grabados digitalmente con modulación de impulsos codificados de instrumentos reales y arreglados en estéreo.

REVERBERATION RYTHMIQUE
La réverbération rythmique peut être appliquée au claquement de tambour, battements de mains et au rim shot.

REVERBERACION DEL RITMO
La reverberación puede otorgarse a los sonidos de percusión del tambor, golpeteo de manos y "rim shot".

TAMBOURS MANUELS
Les instruments à percussion peuvent être joués manuellement sur les deux octaves de gauche du manuel inférieur. L'affectation des instruments à percussion est montrée dans l'illustration, page 51.

SONIDOS DE PERCUSION DE EJECUCION MANUAL
Los instrumentos de percusión pueden ejecutarse manualmente en las dos octavas a la izquierda del manual de acompañamiento. La asignación de los instrumentos de percusión se muestra en la ilustración de la página 71.

BATTEMENTS DE MAINS/TAMBOURIN
Des battements de mains ou le tambourin peuvent être ajoutés aux percussions rythmiques.

GOLPETEO DE MANOS/PANDERETA
Puede agregarse el sonido de golpeteo de manos o pandereta a la percusión del ritmo.

RYTHME DE L'UTILISATEUR 1/2 (8 formes = 2 pistes x 4 variations)
Les formes de rythme, d'introduction/remplissage, basses, accompagnement et arpèges créées avec le DIGITAL COMPOSER peuvent y être mémorisées et rappelées en pressant ces commutateurs. (Voir page 51.)

RITMO DEL INTERPRETE 1 y 2 (modelos = 2 pistas x 4 variaciones)
Los modelos de ritmo, introducción/relleno, graves, acompañamiento y arpegio hechos con el DIGITAL COMPOSER puede almacenarse aquí para recuperarse presionando estos conmutadores. (Vea la página 71.)

SOUTIEN (Bouton de commande)
Les longueurs de soutien des voix UPPER, LOWER et BASS peuvent être modifiées quand les commutateurs SUSTAIN correspondants sont sur ON. (Normalement, les régler sur la position centrale.)

SOSTENIDO (Perilla de control)
La duración del sostenido de los sonidos de UPPER, LOWER y BASS pueden variarse cuando los conmutadores SUSTAIN correspondientes están en ON. (Normalmente, colóquelos en la posición central.)

SOUTIEN (ON/OFF)
Le soutien peut être commuté en et hors circuit (ON/OFF) avec ce commutateur et le niveau réglé avec la commande à curseur SUSTAIN.

SOSTENIDO (ON/OFF)
El sostenido puede activarse o desactivarse mediante este conmutador y su nivel ajustarse con el control deslizante SUSTAIN.

VOLUME
Les volumes des sons du NS-70, groupés en 6 canaux, sont contrôlés de manière à ce que leur balance puisse être vérifiée en un coup d'oeil.

VOLUMEN
El volumen de los sonidos del NS-70, agrupados en 6 canales, es controlado de tal forma que su equilibrio puede verificarse de un vistazo.

VITESSE DE PHASEUR
Fait varier le taux de phase
voix sélectionnées contienne
modifier le taux de phase.
centrale. (Pour la liste des vo
43.)

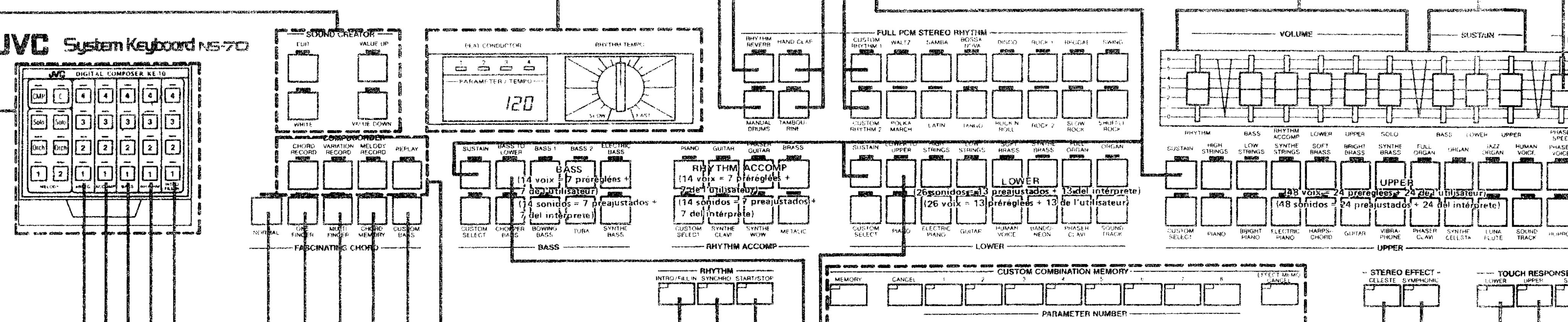
VELOCIDAD DEL ENFASA
Varía la velocidad de la pue
teclado. Cuando se seleccion
modificarse la velocidad de
lóquelo en la posición centr
con efecto de fase, consulte la

REVERBERATION STEREO
Les effets de réverbération s
degrés variés pour une balan
pour régler l'impression glob
régler sur la position centrale.

REVERBERACION ESTERE
Los efectos de reverberación
con diferentes grados para lo
control para ajustar la sensa
mente, colóquelo en la posició

VOLUME MAITRE
Utiliser cette commande pour

VOLUMEN MAESTRO
Utilice este control para ajust


JVC System Keyboard NS-70
SOUND CREATOR
COMPUCORDER
FASCINATING CHORD
120
FULL PCM STEREO RHYTHM
VOLUME
SUSTAIN
BASS
(14 voix = 7 préréglées + 7 de l'utilisateur)
(14 sonidos = 7 preajustados + 7 del intérprete)
RHYTHM ACCOMP
LOWER
(26 sonidos = 13 preajustados + 13 del intérprete)
(26 voix = 13 préréglées + 13 de l'utilisateur)
UPPER
(48 voix = 24 préréglées + 24 de l'utilisateur)
(48 sonidos = 24 preajustados + 24 del intérprete)
RHYTHM
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER
STEREO EFFECT
TOUCH RESPONSE

MEMOIRE DES COMBINAISONS DE L'UTILISATEUR (Voir page 44.)
Les réglages des commutateurs des voix SOLO/UPPER/LOWER/RHYTHM ACCOMP/BASS, la balance du volume, ULTRA CHORD, MAGIC FOOT, STEREO EFFECTS et TOUCH RESPONSE peuvent être mémorisés. Un maximum de 8 réglages différents peuvent être mis en mémoire et rappelés en une touche.

MEMORIA DE COMBINACION DEL INTERPRETE (Vea la página 64.)
Los ajustes de los conmutadores de los sonidos de SOLO/UPPER/LOWER/RHYTHM ACCOMP/BASS, el equilibrio sonoro, ULTRA CHORD, MAGIC FOOT, STEREO EFFECTS y TOUCH RESPONSE pueden almacenarse en la memoria. Hasta 8 diferentes ajustes pueden memorizarse y recuperarse con un solo toque.

COMPUCORDER
(Enregistreur numérique multi-pistes)
Une progression d'accords, une mélodie (mélodie monophonique x 2 ou une mélodie à deux notes x 1), les variations d'accompagnement et d'introduction/remplissage peuvent être enregistrées en utilisant les fonctions d'accompagnement automatique. (Voir page 47.)

COMPUCORDER
(Registrador digital de pista múltiple)
La progresión de acordes, la melodía (2 melodías monofónicas o 1 melodía de dos notas), las variaciones de introducción/relleno y acompañamiento automático pueden registrarse utilizando las funciones de acompañamiento automático. (Vea la página 67.)

LOWER TO UPPER
Les voix de l'inférieur peuvent être jouées sur le manuel supérieur.
Los sonidos del manual de acompañamiento pueden ejecutarse en el de melodía.

BASS TO LOWER
Les voix de basses peuvent être jouées sur les deux octaves de gauche, sur le manuel inférieur.
Los sonidos graves pueden ejecutarse en el manual de acompañamiento en las dos octavas de la izquierda.

RHYTHM
START/STOP
Presser pour mettre le rythme sélectionné en marche ou à l'arrêt.
Presiónelo para iniciar o detener el ritmo seleccionado.

SYNCHRO START
Le rythme commence quand une des touches de l'inférieur manuel est pressée.
El ritmo comienza cuando se presiona una tecla del manual de acompañamiento.

INTRO/FILL IN
Presser pour débuter le rythme par une introduction ou pour insérer une portion rythmique au millieu du jeu.
Presiónelo para iniciar el ritmo con una introducción o insertar una pausa en el ritmo durante la ejecución.

EFFETS
Deux ty
pour em

SYMPH
CELEST
Le son
NIC, pl
mettant
phoniqu

EFECTO
Pueden
fónicos

SINFON
CELEST
El sonid
más lent
expresió
fónica.

TE
nes de rythme sont préréglées. 16 sons de percussion sont enregistrés numériquement en PCM

ACION POR CODIFICACION DE IMPULSOS
delos rítmicos preajustados. 16 sonidos de percusión grabados digitalmente con modulación
ntos reales y arreglados en estéreo.

: appliquée au claque-
ns et au rim shot.

a los sonidos de per-
s y "rim shot".

nt être joués manuel-
ucbe du manuel in-
nts à percussion est

ECUCION

en ējecutarse manual-
uierda del manual de
los instrumentos de
de la página 71.

BATTEMENTS DE MAINS/TAMBOURIN
Des battements de mains ou le tambourin peuvent être ajoutés aux percussions rythmiques.

GOLPETEO DE MANOS/PANDERETA
Puede agregarse el sonido de golpeteo de manos o pandereta a la percusión del ritmo.

RYTHME DE L'UTILISATEUR 1/2 (8 formes = 2 pistes x 4 variations)
Les formes de rythme, d'introduction/remplissage, basses, accompagnement et arpèges créées avec le DIGITAL COMPOSER peuvent y être mémorisées et rappelées en pressant ces commutateurs. (Voir page 51.)

RITMO DEL INTERPRETE 1 y 2 (modelos = 2 pistas x 4 variaciones)
Los modelos de ritmo, introducción/relleno, graves, acompañamiento y arpegio hechos con el DIGITAL COMPOSER puede almacenarse aquí para recuperarse presionando estos conmutadores. (Vea la página 71.)

SOUTIEN (Bouton de commande)
Les longueurs de soutien des voix UPPER, LOWER et BASS peuvent être modifiées quand les commutateurs SUSTAIN correspondants sont sur ON. (Normalement, les régler sur la position centrale.)

SOSTENIDO (Perilla de control)
La duración del sostenido de los sonidos de UPPER, LOWER y BASS pueden variarse cuando los conmutadores SUSTAIN correspondientes están en ON. (Normalmente, colóquelos en la posición central.)

SOUTIEN (ON/OFF)
Le soutien peut être commuté en et hors circuit (ON/OFF) avec ce commutateur et le niveau réglé avec la commande à curseur SUSTAIN.

SOSTENIDO (ON/OFF)
El sostenido puede activarse o desactivarse mediante este conmutador y su nivel ajustarse con el control deslizante SUSTAIN.

VOLUME
Les volumes des sons du NS-70, groupés en 6 canaux, sont contrôlés de manière à ce que leur balance puisse être vérifiée en un coup d'oeil.

VOLUMEN
El volumen de los sonidos del NS-70, agrupados en 6 canales, es controlado de tal forma que su equilibrio puede verificarse de un vistazo.

VITESSE DE PHASEUR
Fait varier le taux de phase ajouté aux voix du clavier. Quand les voix sélectionnées contiennent l'effet de phase, il est possible de modifier le taux de phase. La régler normalement sur la position centrale. (Pour la liste des voix contenant l'effet de phase, voir page 43.)

VELOCIDAD DEL ENFASADOR
Varía la velocidad de la puesta en fase agregada a los sonidos del teclado. Cuando se seleccionan sonidos con efecto de fase, puede modificarse la velocidad de la puesta en fase. Normalmente colóquelo en la posición central. (En cuanto a la lista de los sonidos con efecto de fase, consulte la página 63.)

REVERBERATION STEREO
Les effets de réverbération sont ajoutés à différentes voix avec des degrés variés pour une balance optimale. Utiliser cette commande pour régler l'impression globale de profondeur. (Normalement, la régler sur la position centrale.)

REVERBERACION ESTEREO
Los efectos de reverberación son agregados a los diferentes sonidos con diferentes grados para lograr un equilibrio óptimo. Utilice este control para ajustar la sensación total de profundidad. (Normalmente, colóquelo en la posición central.)

VOLUME MAITRE
Utiliser cette commande pour régler le volume global du NS-70.

VOLUMEN MAESTRO
Utilice este control para ajustar el volumen total del NS-70.

ULTRA CHORD
L'harmonie correspondant à l'accord joué par l'accompagnement automatique est ajoutée à la mélodie d'une note jouée sur le supérieur manuel. Deux types d'harmonies sont prévus.

- ①**FERME:** Harmonies s'étendant sur moins d'une octave, comme le jeu de bloc du piano ou de l'orgue.
- ②**OUVERT:** Harmonies d'étendant sur plus d'une octave, comme celles qui sont arrangées pour les grands orchestres.

ULTRA CHORD
Se agrega una armonía correspondiente al acorde ejecutado mediante el acompañamiento automático a la melodía de una nota tocada en el manual de melodía. Se proveen dos tipos de armonías.

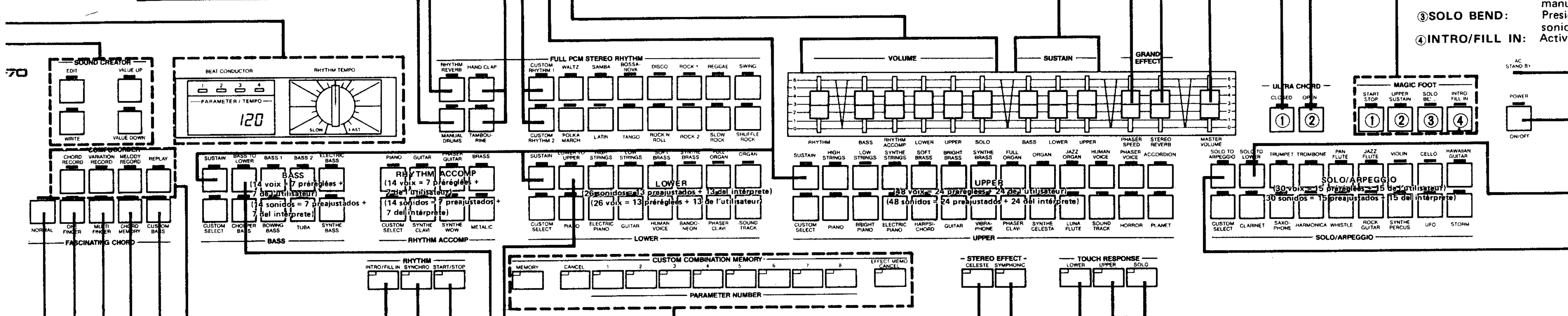
- ①**CLOSED:** Armonías dentro de una octava, como la ejecución en bloque de piano u órgano.
- ②**OPEN:** Armonías que se extienden más allá de una octava, como aquéllas compuestas para las grandes bandas.

PEDALIER MAGIQUE
Quand le commutateur au pied (fourni) ou le clavier à pédales (optionnel) est utilisé, les fonctions suivantes peuvent être mises en et hors circuit (ON/OFF) avec le pied. (Pour les raccordements, voir page 56.)

- ①**START/STOP:** Le rythme démarre ou s'arrête.
- ②**UPPER SUSTAIN:** Appuyer sur le commutateur pour le soutien de la voix du supérieur.
- ③**SOLO BEND:** Appuyer sur le commutateur pour une courbure de hauteur de voix solo par demi-étapes.
- ④**INTRO/FILL IN:** L'introduction/remplissage du rythme en circuit (ON).

PEDAL MAGICO
Cuando se utiliza el interruptor de pie (suministrado) o la pedalera (opcional), las siguientes funciones pueden activarse o desactivarse con el pie. (En cuanto a la conexión, consulte la página 76.)

- ①**START/STOP:** Inicio o detención del ritmo.
- ②**UPPER SUSTAIN:** Presione el conmutador para el sostenido del sonido del manual de melodía.
- ③**SOLO BEND:** Presione el conmutador para la inflexión de la altura del sonido de solo de semitono.
- ④**INTRO/FILL IN:** Activación de la introducción/relleno del ritmo.


70
SOUND CREATOR
EDIT
VALUE UP
WRITE
VALUE DOWN
BEAT CONDUCTOR
1 2 3 4
PARAMETER / TEMPO
120
RHYTHM TEMPO
SLOW
FAST
RHYTHM REVERB
HAND CLAP
MANUAL DRUMS
TAMBOURINE
FULL PCM STEREO RHYTHM
CUSTOM RHYTHM 1
WALTZ
SAMBA
BOSSA-NOVA
DISCO
ROCK 1
REGGAE
SWING
CUSTOM RHYTHM 2
POLKA MARCH
LATIN
TANGO
ROCK'N ROLL
ROCK 2
SLOW ROCK
SHUFFLE ROCK
COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY
NORMAL
ONE FINGER
MULTI FINGER
CHORD MEMORY
CUSTOM BASS
FASCINATING CHORD
SUSTAIN
BASS TO LOWER
BASS 1
BASS 2
ELECTRIC BASS
BASS
(14 voix = 7 préréglées + 7 de l'utilisateur)
(14 sonidos = 7 preajustados + 7 del intérprete)
CUSTOM SELECT
CHOPPER BASS
BOWING BASS
TUBA
SYNTHE BASS
BASS
PIANO
GUITAR
PHASER GUITAR
BRASS
RHYTHM ACCOMP
(14 voix = 7 préréglées + 7 de l'utilisateur)
(14 sonidos = 7 preajustados + 7 del intérprete)
CUSTOM SELECT
SYNTHE CLAVI
SYNTHE WOW
METALIC
RHYTHM ACCOMP
SUSTAIN
LOWER TO UPPER
HIGH STRINGS
LOW STRINGS
SOFT BRASS
SYNTHE BRASS
FULL ORGAN
ORGAN
LOWER
(26 sonidos = 13 preajustados + 13 del intérprete)
(26 voix = 13 préréglées + 13 de l'utilisateur)
CUSTOM SELECT
PIANO
ELECTRIC PIANO
GUITAR
HUMAN VOICE
BANDONEON
PHASER CLAVI
SOUND TRACK
LOWER
RHYTHM
INTRO/FILL IN
SYNCHRO
START/STOP
CUSTOM COMBINATION MEMORY
MEMORY
CANCEL
1 2 3 4 5 6 7 8
EFFECT MEMO CANCEL
PARAMETER NUMBER
VOLUME
SUSTAIN
GRAND EFFECT
RHYTHM
BASS
RHYTHM ACCOMP
LOWER
UPPER
SOLO
BASS
LOWER
UPPER
PHASER SPEED
STEREO REVERB
MASTER VOLUME
SUSTAIN
HIGH STRINGS
LOW STRINGS
SYNTHE STRINGS
SOFT BRASS
BRIGHT BRASS
SYNTHE BRASS
FULL ORGAN
ORGAN
JAZZ ORGAN
HUMAN VOICE
PHASER VOICE
ACCORDION
UPPER
(48 voix = 24 préréglées + 24 de l'utilisateur)
(48 sonidos = 24 preajustados + 24 del intérprete)
CUSTOM SELECT
PIANO
BRIGHT PIANO
ELECTRIC PIANO
HARPSICHORD
GUITAR
VIBRAPHONE
PHASER CLAVI
SYNTHE CELESTA
LUNA FLUTE
SOUND TRACK
HORROR
PLANET
UPPER
STEREO EFFECT
CELESTE
SYMPHONIC
TOUCH RESPONSE
LOWER
UPPER
SOLO
ULTRA CHORD
CLOSED
OPEN
① ②
MAGIC FOOT
START STOP
UPPER SUSTAIN
SOLO BEND
INTRO FILL IN
① ② ③ ④
AC STAND BY
POWER
ON/OFF
SOLO TO ARPEGGIO
SOLO TO LOWER
TRUMPET
TROMBONE
PAN FLUTE
JAZZ FLUTE
VIOLIN
CELLO
HAWAIIAN GUITAR
SOLO/ARPEGGIO
(30 voix = 15 préréglées + 15 de l'utilisateur)
(30 sonidos = 15 preajustados + 15 del intérprete)
CUSTOM SELECT
CLARINET
SAXOPHONE
HARMONICA
WHISTLE
ROCK GUITAR
SYNTHE PERCUS
UFO
STORM
SOLO/ARPEGGIO

LAMPE D'ATTENTE CA
LAMPARA INDICADORA DE ENCENDIDO EN ESPERA

INTERRUPTEUR D'ALIMENTATION
INTERRUPTOR DE ALIMENTACION

; soient pressées.

sur ON.
onmutador está en ON.

COMPUCORDER
(Enregistreur numérique multi-pistes)
Une progression d'accords, une mélodie (mélodie monophonique x 2 ou une mélodie à deux notes x 1), les variations d'accompagnement et d'introduction/remplissage peuvent être enregistrées en utilisant les fonctions d'accompagnement automatique. (Voir page 47.)

COMPUCORDER
(Registrador digital de pista múltiple)
La progresión de acordes, la melodía (2 melodías monofónicas o l melodía de dos notas), las variaciones de introducción/relleno y acompañamiento automático pueden registrarse utilizando las funciones de acompañamiento automático. (Vea la página 67.)

MEMOIRE DES COMBINAISONS DE L'UTILISATEUR (Voir page 44.)
Les réglages des commutateurs des voix SOLO/UPPER/LOWER/RHYTHM ACCOMP/BASS, la balance du volume, ULTRA CHORD, MAGIC FOOT, STEREO EFFECTS et TOUCH RESPONSE peuvent être mémorisés. Un maximum de 8 réglages différents peuvent être mis en mémoire et rappelés en une touche.

MEMORIA DE COMBINACION DEL INTERPRETE (Vea la página 64.)
Los ajustes de los conmutadores de los sonidos de SOLO/UPPER/LOWER/RHYTHM ACCOMP/BASS, el equilibrio sonoro, ULTRA CHORD, MAGIC FOOT, STEREO EFFECTS y TOUCH RESPONSE pueden almacenarse en la memoria. Hasta 8 diferentes ajustes pueden memorizarse y recuperarse con un solo toque.

LOWER TO UPPER
Les voix de l'inférieur peuvent être jouées sur le manuel supérieur.
Los sonidos del manual de acompañamiento pueden ejecutarse en el de melodía.

BASS TO LOWER
Les voix de basses peuvent être jouées sur les deux octaves de gauche, sur le manuel inférieur.
Los sonidos graves pueden ejecutarse en el manual de acompañamiento en las dos octavas de la izquierda.

RHYTHM
START/STOP
Presser pour mettre le rythme sélectionné en marche ou à l'arrêt.
Presiónelo para iniciar o detener el ritmo seleccionado.

SYNCHRO START
Le rythme commence quand une des touches de l'inférieur manuel est pressée.
El ritmo comienza cuando se presiona una tecla del manual de acompañamiento.

INTRO/FILL IN
Presser pour débuter le rythme par une introduction ou pour insérer une portion rythmique au millieu du jeu.
Presiónelo para iniciar el ritmo con una introducción o insertar una pausa en el ritmo durante la ejecución.

EFFETS STEREO
Deux types d'effets stéréo peuvent être ajoutés pour embellir la musique.

SYMPHONIQUE
CELESTE
Le son volutant de CELESTE et le SYMPHONIC, plus lent, donnent plus d'expression en mettant en valeur l'image sonore stéréophonique.

EFECTOS ESTEREO
Pueden agregarse dos tipos de efectos estereofónicos para un embellecimiento musical.

SINFONICO
CELESTE
El sonido de CELESTE y su correspondiente más lento SYMPHONIC, posibilitan una mayor expresión realzando la imagen sonora estereofónica.

REPONSE DE TOUCHE
Le volume et le timbre peuvent être modifiés selon la force avec laquelle les touches sont pressées; une expression et un jeu plus détaillés sont possibles. Cette fonction peut être commutée en et hors circuit (ON/OFF) séparément pour les voix SOLO, UPPER et LOWER.

RESPUESTA DE PULSACION (TOUCH RESPONSE)
El volumen y el timbre pueden variarse de acuerdo con la fuerza con que se pulsen las teclas: es posible el volumen global y la ejecución detallada. Esta función puede activarse/desactivarse separadamente para los sonidos de SOLO, UPPER y LOWER.

SOLO TO LOWER
Les voix de solo, normalement jouées sur le manuel supérieur, peuvent être jouées sur le manuel inférieur. Toutefois cette fonction ne marche pas quand le FASCINATING CHORD est utilisé, ou pendant le COMPUCORDER REPLAY même si la diode LED SOLO TO LOWER est allumée.

Los sonidos de solo, ejecutados generalmente en el manual de melodía, pueden tocarse en el manual de acompañamiento. Sin embargo, esta función se anula cuando se utiliza el FASCINATING CHORD o durante COMPUCORDER REPLAY, aunque el LED de SOLO TO LOWER esté encendido.

SOLO TO ARPEGGIO
Les voix solo peuvent être utilisées pour jouer les arpèges.
Los sonidos de solo pueden utilizarse para ejecutar arpegios.

VOIX PREREGLEES/DE L'UTILISATEUR
Deux types de voix sont disponibles: préréglées et de l'utilisateur. (Voir page 42.)
Les voix de l'utilisateur peuvent être sélectionnées en pressant les commutateurs CUSTOM SELECT.

Pour rappeler la voix de l'utilisateur, se reporter au volume séparé "Créateur de sons" page 50. Les données de la voix de l'utilisateur seront perdues si l'alimentation du NS-70 est coupée pendant plus de deux semaines. Pour éviter cela, stocker les données dans une DIGITAL MEMORY (optionnelle) ou dans une CUSTOM COMBINATION MEMORY, ou s'assurer d'alimenter le NS-70 au moins une fois toutes les deux semaines.

SONIDOS PREAJUSTADOS/DEL INTERPRETE
Se disponen de dos clases de sonidos: preajustados y del intérprete. (Vea la página 62.)
Los sonidos del intérprete pueden seleccionarse presionando los conmutadores CUSTOM SELECT.

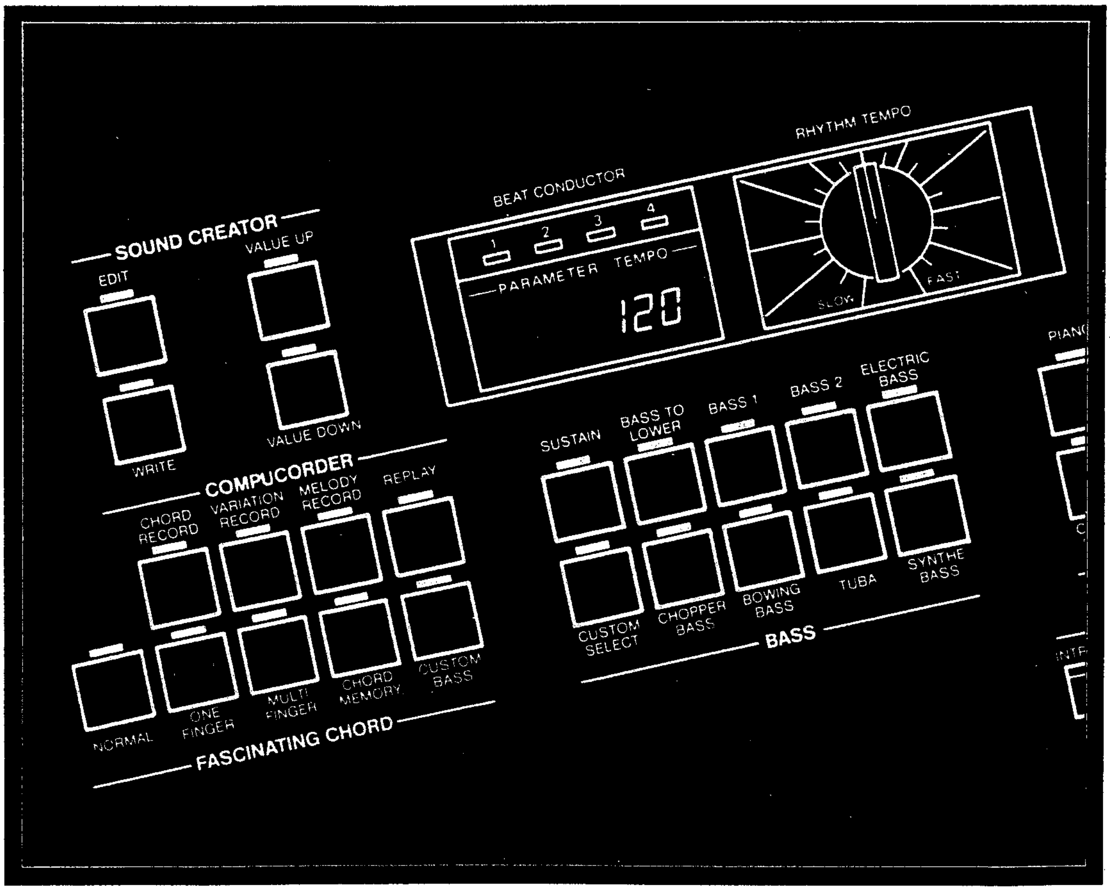
Para recuperar el sonido del intérprete, refiérase al manual separado "Creador de Sonidos", página 68. Los datos del sonido del intérprete se perderán si el NS-70 queda desconectado por más de dos semanas. Para evitar esto, almacene los datos en un DIGITAL MEMORY (opcional) o en un CUSTOM COMBINATION MEMORY o encienda la unidad al menos una vez cada dos semanas.

JVC

System Keyboard NS-70

THE SOUND CREATOR MANUAL

HANDBUCH ZUM KLANGPROGRAMMIERER
MANUEL DU CREATEUR DE SONS
MANUAL DEL CREADOR DE SONIDOS


SOUND CREATOR
EDIT
VALUE UP
WRITE
VALUE DOWN
BEAT CONDUCTOR
1
2
3
4
PARAMETER
TEMPO
120
RHYTHM TEMPO
SLOW
FAST
COMPUCORDER
CHORD RECORD
VARIATION RECORD
MELODY RECORD
REPLAY
NORMAL
ONE FINGER
MULTI FINGER
CHORD MEMORY
CUSTOM BASS
FASCINATING CHORD
SUSTAIN
BASS TO LOWER
BASS 1
BASS 2
ELECTRIC BASS
CUSTOM SELECT
CHOPPER BASS
BOWING BASS
TUBA
SYNTHE BASS
BASS

Discover new sounds and original voices using the NS-70's Sound Creator.
Entdecken Sie revolutionäre Klänge und neuartige Instrumentstimmen mit dem NS-70 Klangprogrammierer.
Dévouvrez de nouveaux sons et des voix originales avec le créateur de sons du NS-70.
Descubra nuevos y originales sonidos utilizando el Creador de Sonidos del NS-70.

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The Joy of Synthesizers 1
Sound Creation Using the NS-70 3
Parameter List 9
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Hints for Sound Making 17
Troublshooting during Sound Making 18

THE JOY OF SYNTHESIZERS

You CAN play a synthesizer. How do we know? Well, there are may people with little or no idea of the workings of an internal combustion engine who nevertheless make excellent motorists.
This little guide is intended to show you that with just a little information on the basic components of a synthesizer and how they work, you will be well on your way to discovering the joy of synthesizing.

What is a synthesizer?
Basically, a synthesizer is an electronic device with which one can make sounds. It has three basic parts: a sound generator, a volume changer, and a tone changer. The sound generator is an oscillator, something that creates sound by moving, or oscillating. A fluorescent light is an oscillator: when the room is very quiet, if you get close enough you can hear a slight hum. This hum is produced by the light actually going on and off 120 times a second; more technically speaking we say it has a frequency of 60* cycles per second, also called Hertz. In fact, 60 Hz is very close to the B^b note two octaves below middle C, which has a frequency of 58.55 Hz. So far then, it seems the fluorescent light is a very crude synthesizer: it is an oscillator fixed at a single frequency, (60 Hz), or, in musical terms, close to the pitch B^b two octaves below middle C.
If we could then hook up a microphone to pick up the sound of the fluorescent light, and run the microphone through an amplifier, we would have two thirds of a synthesizer: an oscillator generating a sound, and an amplifier which makes the sound louder.
Finally, if, instead of running the amplifier directly through a speaker, we could first attach a graphic equalizer, we would have the basic makings of a synthesizer: an oscillator, an amplifier and a filter.

How does the synthesizer work?
Using our 'fluorescent light synthesizer' we are able to synthesize. We are, however, quite limited in the scope of our ability: we have a single frequency, 60 Hz, which we can change by making louder, and by emphasizing different aspects of its tone using a graphic equalizer.

Using a keyboard synthesizer we have much more creative power. First, we can choose different pitches if we like: pressing different keyboard keys tells the oscillator to oscillate at different rates and thus to produce different frequencies. In other words, we're not limited to only (approximately) B^b. Nor are we simply dealing with a 'passive' amplifier. The synthesizer amplifier, VCA (Voltage-Controlled Amplifier), will carry out more complicated tasks than merely giving any sound that passes through it more volume. The VCA, for example, can be told to make any sound become slowly louder, reach a peak volume, and then quickly vanish. This is known as envelope generation. An envelope is the description of the behaviour of the volume or tone of a sound, over time.

Instead of, but not unlike, a graphic equalizer, the synthesizer has something called a VCF, (Voltage-Controlled Filter), which contains several sub-components that help to shape the sound. Obviously, its main components are filters: these block or let pass certain parts of the sound that is sent through. Like the VCA, the VCF is more than just a passive control, it carries out complicated instructions. Using the VCF we can control the tone of the sound over time so that, for example, we can make a sound start out with a soft, muffled tone, quickly change to a high, bright tone and then back to a muffled tone. In other words, the VCF can be used to generate a tone envelope.

Another part of the VCF is the resonance circuit. This device can radically change the tone, and even the quality of any sound. If we'd had a resonance control on our fluorescent synthesizer, we could have changed the sound of that light from a low hum into a high, thin, "twisting" whine.

(*This example is based on countries using 60 Hz AC.)

What are waves?

To go any deeper, we need to know about waves, and wave forms. Again, let's go back to the fluorescent light. Earlier we said it has a frequency of 60 Hz, or 60 cycles per second. A cycle is one full oscillation of a wave. That is, starting from a central position, "0", reaching a peak, going back down through the central position again, reaching a minimum (inverse or negative peak) and then coming back to the central position, as in Fig. 1.

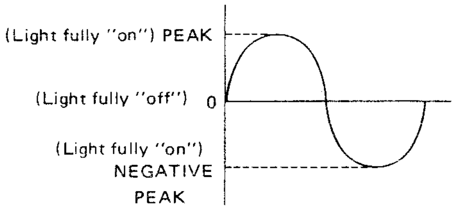


Fig. 1 A full cycle (Sine wave)

The fluorescent light, with its 60 cycles per second, is actually going on and off 120 times per second (one cycle = 2 "on"s). If it were possible to change the frequency of the light, by slowing it down enough, a strobe light, or flashbulb effect would result. Conversely, by increasing the rate, the light would become stronger and brighter as there would be shorter dark periods separating the flashes of light.

Making the fluorescent light frequency faster or slower would also change its musical pitch higher or lower respectively. A frequency low enough to cause the flashbulb effect would not produce a constant tone, but a series of clicks instead. As the light is made brighter, so would the pitch become higher as well.

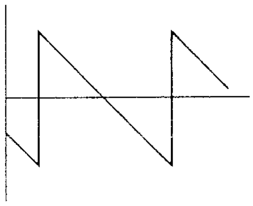


Fig. 2 Sawtooth wave

Waveforms – There are different kinds of wave forms. Fig. 1 shows a sine wave, with evenly curved peaks and valleys.

Sine waves are the basis of all sound. When different sine waves are added together, more complicated waves result. Two such complicated waveforms are the Sawtooth, and the square waves, figures 2, and 3, respectively. These are the basic shapes of all acoustic instrument waves. The sawtooth wave is characteristic of strings and brass instruments while the square wave is the basic shape produced by wood-winds and reeds.

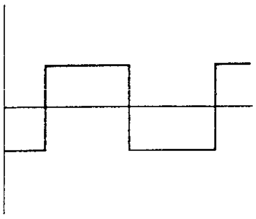
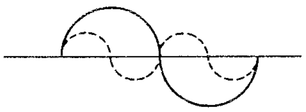


Fig. 3 Square wave

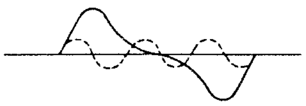
This principle allows us to recreate more faithfully the sounds of actual instruments. By adding a group of sine waves together – a fundemental, and a number of harmonics – we can very accurately approximate an instrument's waveform, and of course, its sound.

Fundamental and Harmonic Frequencies

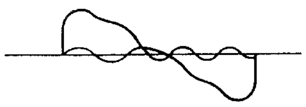
It is not necessary to go into great depth to understand these terms, the following explanation will do, and it will help you to understand what the VCF component can do.



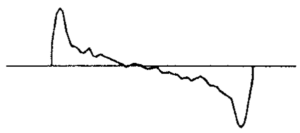
(a) Fundamental



(b) + harmonic 1



(c) + harmonic 2



(d) = the waveform of an actual instrument.

Fig. 4.

The **fundamental** is the 'main frequency', the one that tells you the pitch : There are other 'sub-frequencies' that accompany the fundamental, and these vary in description and number and from instrument to instrument. These are called **harmonic** frequencies. Think of the fundamental as the melody, and the harmonics as harmonies.

To continue this analogy, think of how different harmonies can change the way we hear a melody. The same melody can sound like any number of different songs if the harmonies are changed.

Now, instead of harmonies and melodies, think of two instruments, playing the same note. Harmonics help you to tell these instruments, a violin and a clarinet, for example, apart. Or, whatever the melody, a violin will always 'sing' it using its own distinctive violin-style harmonies that are quite different from those 'used' by the clarinet.

Imagine, if you could tamper with these harmonies, as though they were a group of back-up singers each with a different part, and you could tell them how to sing these parts – or even **not** to sing. This is exactly what you can do using the VCF. You can increase the number of different back-up singers, or decrease them, you can tell some of them to sing louder than they are supposed to, you can even teach them to sing their parts in strange ways. To put it slightly more technically, you use the VCF to filter out certain harmonic frequencies, or let more of them through, and to change the strength of some of them, as well as their behavior.

Note:

When we speak of 'back-up singers' representing hamonic frequencies, remember that we are talking about music played one note at a time (monophonically). While, of course, the same principles govern polyphonic instrument voices, in this explanation we are illustrating what makes two (or any number of) different instruments playing the same note recognizable. Another way of looking at it is to look at it. (See Figs. 5 and 6.)

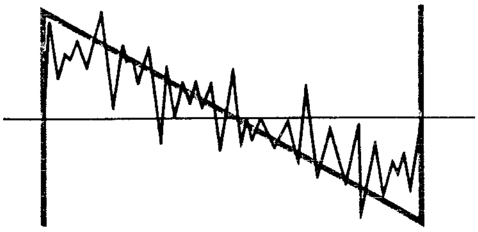


Fig. 5 Violin

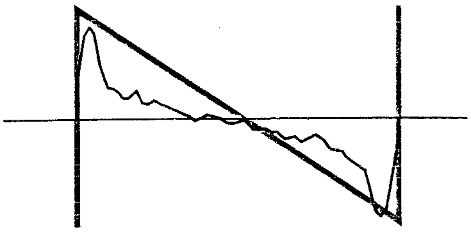


Fig. 6 Trumpet

Figure 5 shows a violin playing a note, and figure 6 depicts a trumpet playing the same note. While in any one second period you would be able to count the same number of cycles, on each graph, notice the different shapes of the waves. Both are sawtooth waves, or at least, could be made using a very good synthesizer and starting with a sawtooth wave, but the harmonic content of each instrument's wave is different.

Summary

A synthesizer incorporates three main blocks: a sound generator called a DCO, Digitally Controlled Oscillator; a volume changer called a VCA, Voltage Controlled Amplifier; and a tone changer called a VCF, Voltage Controlled Filter. The DCO generates a wave. You determine its frequency, or pitch, by pressing a key. The wave goes through the VCA which controls the size of the wave, (the volume), and the volume envelope, (the changes in the behavior of volume over time). Finally, the wave passes through the VCF which determines the tonal color and behavior of the wave through manipulation of the harmonic frequencies.

SOUND CREATION USING THE NS-70

Sound has three major elements:

- **Pitch**: The frequency of a note is the number of wave cycles per second. The musical scale is divided by pitches (A, B, C, D, E,F, G).
- **Volume**: The size of the waves (loudness).
- **Timbre** (unique tonal characteristics): The combination of fundamental and harmonic frequencies plus the shape of the wave. Timbre, for example, helps you tell the difference between a violin and a flute playing the same note.

DCO

The DCO, Digitally-Controlled Oscillator, is the synthesizer's primary sound generator. There are two basic sound sources; the Sawtooth wave, and the Square wave. The DCO generates these waves, and pressing the keyboard keys determines their frequencies, or "pitches". Middle "C" is a pitch; it has a frequency of 261.6 Hz (cycles per second) – press this key and the wave you have selected will go up and down 261.6 times in one second, producing the note 'Middle C'.

Two DCOs are provided with the NS-70; DCO1 and DCO2. When these are used simultaneously, the resulting sound will be more dense. When they are used simultaneously with a one-octave difference between them, the sound will have a wider image.
In addition to the waveforms prepared in the DCOs, there is a sound source called noise; this is an irregularly-shaped waveform which produces a "sh" sound. This can be mixed with the flute or sax voice to simulate breath sounds or, it can be used alone to produce the sound of wind and other sound effects.

VCA & ENVELOPE GENERATOR

This block controls the sound level, or volume. In sound synthesizing, the behaviour of volume over time is important because it varies from instrument to instrument. For example, the changes undergone by the volumes of organ, piano and strings are very different:

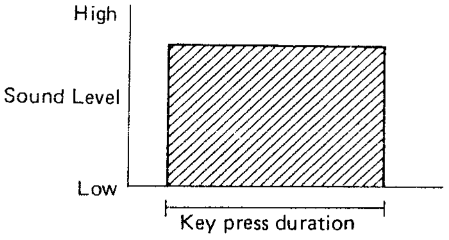


Fig. 7 Organ

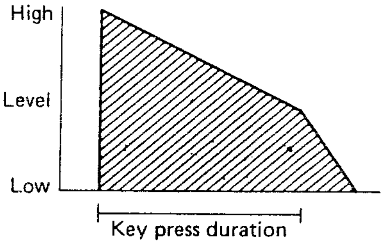


Fig. 8. Piano

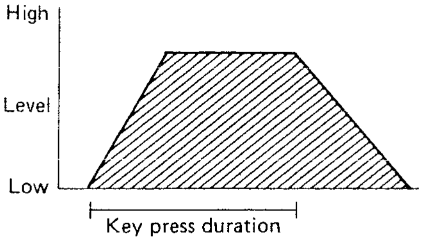


Fig. 9. Strings

- **Organ:** The sound hits its peak volume when the key is pressed, and continues at the same level until the key is released which immediately cuts the sound off. (Fig. 7)
- **Piano:** After reaching its peak when the key is first pressed, the sound slowly decays until it disappears. If the note is held long enough the key release will have no effect; if the key is released quickly, the decay will be abruptly interrupted, and the sound cut off. (Fig. 8)
- **Strings:** The note is not produced immediately upon hitting the key, but gradually and continually reaches its peak and stays at this level while the key is being pressed. When the key is released, the tone gradually decays. (Fig. 9)

The graphic representations or "shapes" of these volume level behaviours are called envelopes; these are produced by the Envelope Generator (EG) function.

EG (Envelope Generator)

The shapes of volume produced by the EG can be divided into the five following stages:

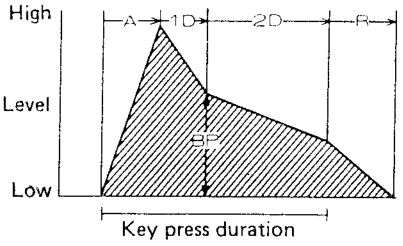


Fig. 10 Envelope Stages

- **Attack** (section A in the figure)
  This is the length of time until the sound is heard after a key is pressed. The more the Attack value is increased, the later the sound is heard.
- **1st decay** (section 1D in the figure)
  This is the length of time between the sound level peak and the break point.
- **Break point** (level BP in the figure)
  This is a sound level transition point, occurring where the 1st decay level decrease is replaced by the 2nd decay decrease. The more the value is increased, the more smoothly the sound decays, and the more the value is decreased, the more rapidly the sound decays.
- **2nd decay** (section 2D in the figure)
  This is the length of time until the sound reaches its lowest audible level after the break point, while the key is still pressed. When this is set to the maximum value "31", the sound will be sustained continuously at the break point level.
- **Release**
  This describes the abruptness with which the sound vanishes after the key is released. The more the value is increased, the more slowly the sound vanishes.

The shape of envelope follows these five stages. Why two kinds of decay? The characteristics of actual piano, for example, are as follows: sound decays rapidly after the key is hit, then vanishes slowly while the key is still depressed. With the NS-70, the envelope can be shaped more closely to the actual piano sound by using two decays and break point as shown in Fig. 11.

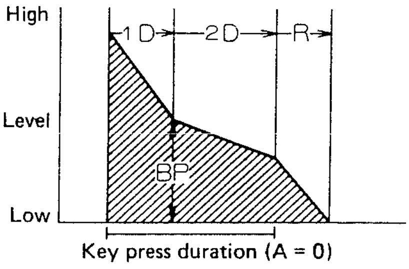
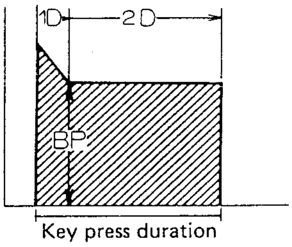


Fig. 11. Piano

In the same way, organ, and string tones can also be made to sound more authentic.



A = 0, R = 0
2D = Max.

Fig. 12. Jazz Organ

Recreating the percussive characteristic of jazz organ is accomplished through envelope generation.

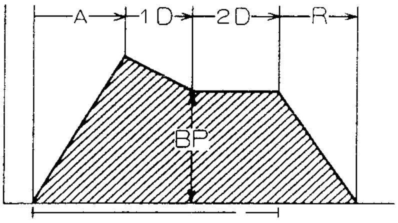


Fig. 13. Strings

As in the case of Jazz Organ, a more true-to-life sound is created by causing the volume to decay to a slightly lower continuous level after a sharp attack. (Of course, unlike the organ, strings have a slow post-release decay.)

A data list is provided giving the concrete values of attack, 1st decay, 2nd decay and release, for each of the preset voices of the NS-70.

As well as controlling the sound level, the VCA block also includes a function called "special percussive mode" which makes percussive tones sound more natural. When this function is switched ON, the following two circuits are activated:

- **1st decay keep**
  When the key is released in the middle of the 1st decay, the sound does not transit to the release stage until after the level has dropped to the break point. This function makes staccato sounds, for example, seem more natural.
- **2nd decay & release keyboard follow**
  The length of release can be varied on the upper and lower notes. The higher the note, the shorter the release. This function makes the piano voice sound more like a real piano.

VCF

This block controls the timbre (the tonal characteristics that enable us to tell one instrument from another). The various timbre-controlling components of the VCF are described below.

- **Cut-off**
  Cut-off High: More of the higher frequencies are passed. (Violin, Harpsichord)
  Cut-off Low: Most of the higher frequencies are blocked. (Flute, Piano)
  This function can be regarded as a powerful version of a graphic equalizer. When it is increased, the tone becomes bright and sharp (treble), and when it is decreased, the sound becomes softer (bass).
  With this function, the violin tone can be made to resemble a flute if the cut-off is set to a low value.
- **Resonance**
  A key tool for use in the modification of sound, this VCF component is a means of making sounds that run the gamut from normal to bizarre. A low resonance value will not have much affect, whereas a high resonance will change a voice by making it very sharp and "thin."
- **Keyboard track**
  This function affords more realistic reproduction of certain instruments. When keyboard track is on, the higher octave notes will have more strength than they do normally, while the lower notes will remain unaffected. The degree to which keyboard track is applied is controlled in three steps; the more the value is increased, the greater the difference between high and low octaves.

The VCF also determines envelope.
The volume envelope describes the varying sound levels during different stages. (The sound is continuously maintained at a certain level, or gradually diminishes, etc.)
The tone envelope on the other hand, describes how the sound changes between soft (bass) tones and bright (treble) ones. (The same tone is kept continuously maintained, or gradually softens, etc.)
All voices do not have this varying envelope of tone quality, and the degree of the application of effect can be adjusted. When a voice is not given this envelope effect, its tone stays at the level determined by the cut-off control. The envelope of tone quality is clearly effective in making the Brass and Sound Track voices more authentic sounding.

- **Brass**
  When the key is pressed, the brass voice, soft and slightly muffled at first, quickly becomes bright and sharp. As the volume decays, so does the tone and the note ends as it began; soft and slightly muffled. These transitions make the tone sound like real brass.

The VCF envelope (Fig. 14) and VCA envelope (Fig. 15) have very similar shapes.

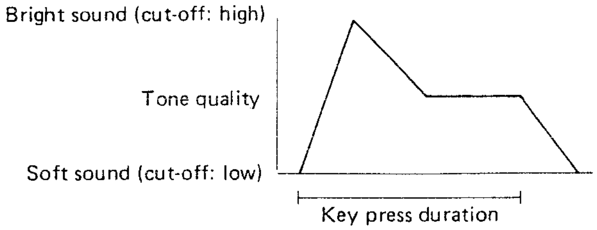

Bright sound (cut-off: high)
Tone quality
Soft sound (cut-off: low)
Key press duration

Fig. 14 Tone-quality envelope (VCF)

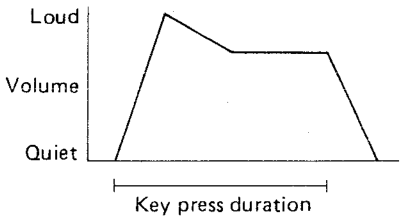

Loud
Volume
Quiet
Key press duration

Fig. 15 Volume envelope (VCA)

- **Sound Track**
  When the key is pressed, first a soft tone is produced which slowly becomes solid and stays at a continuous level. When the key is released, the tone grows increasingly softer. In this case, the tone envelope (Fig. 16) and volume envelope (Fig. 17) have different shapes because of the different attack lengths.

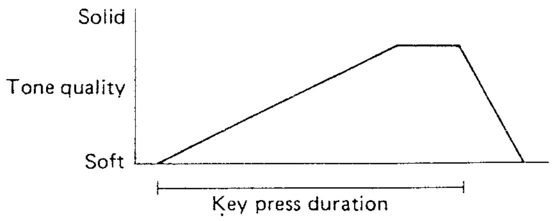

Solid
Tone quality
Soft
Key press duration

Fig. 16 Tone-quality envelope (VCF)

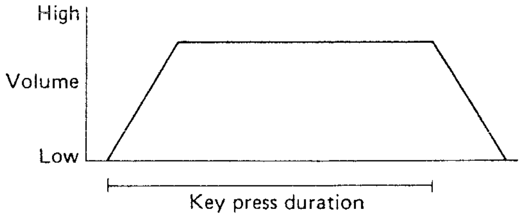

High
Volume
Low
Key press duration

Fig. 17 Volume envelope (VCA)

While the volume envelope comprises five stages; attack, 1st decay, break point, 2nd decay, and release, the tone envelope has only the following four:

- **Attack**
- **Decay** } (re-grouped from the 1st decay, break point and 2nd decay)
- **Sustain**
- **Release**

- **Attack** (section A in the figure)
  The length of time until the tone reaches its bright tonal peak (as determined by the cut-off level) after a key is pressed.
- **Decay** (section D in the figure)
  The length of time between the tonal peak and the level that is continuously maintained while the key is pressed. (The period of decrease from the cut-off level.)
- **Sustain** (section S in the figure)
  The tone quality which is continuously maintained while the key is pressed.
- **Release** (section R in the figure)
  The length of time until the tone quality reaches its lowest level of softness after the key is released (depending on the release time of the VCA envelope).

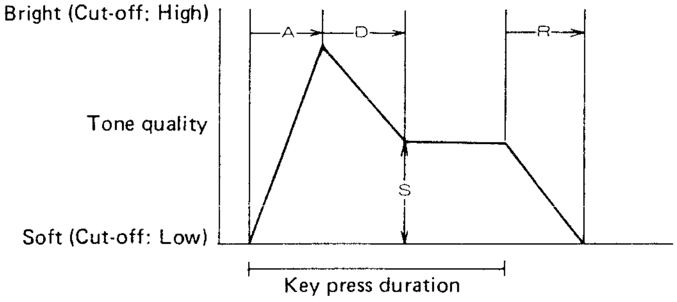

Bright (Cut-off: High)
Tone quality
Soft (Cut-off: Low)
A
D
R
S
Key press duration

Fig. 18

As described so far, the tone quality can be modified to vary between bass and treble according to the shape of envelope generated by the EG (by creating a rising and falling cut-off level.)
When the EG function is augmented by increasing the **resonance**, anything from howling to wah-wah sounds can be generated. When the resonance is raised on a brass voice, for example, it will sound less like an "acoustic" instrument and more like a "machine".

Polarity
The polarity function is provided only with the tone quality (VCF) EG.
An envelope can be reversed as shown in Fig. 20.

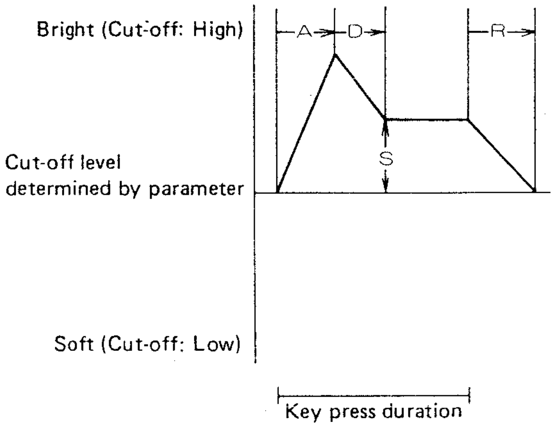

Bright (Cut-off: High)
A
D
R
S
Cut-off level determined by parameter
Soft (Cut-off: Low)
Key press duration

Fig. 19 Positive Polarity (Normal)

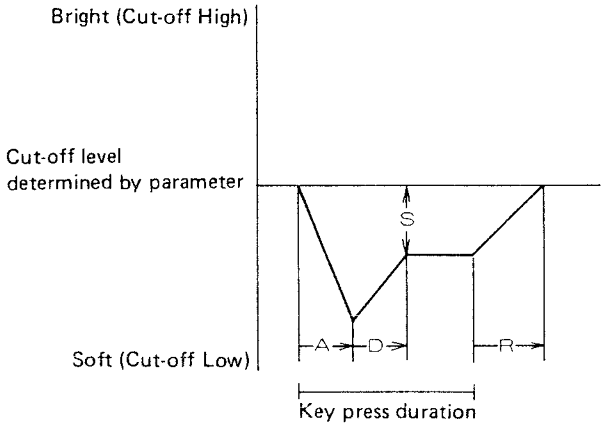

Bright (Cut-off High)
Cut-off level determined by parameter
S
A
D
R
Soft (Cut-off Low)
Key press duration

Fig. 20 Reversed Polarity

Cut-off level determined by cut-off parameter Key press duration

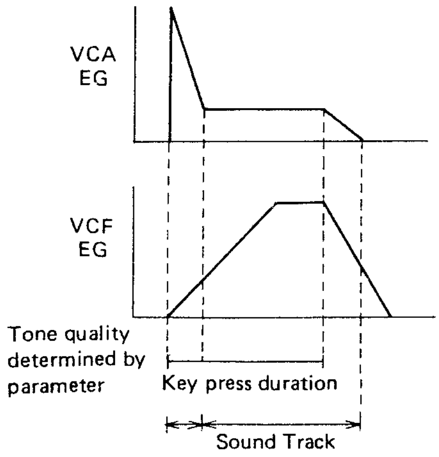
The reversing of polarity produces the "mirror image" of the changing stages of tone quality. The EG functions in reverse are as follows:

- **Attack**
  The length of time until the tone reaches its "softness minimum" (as determined by the cut-off level) after the key is pressed.
- **Decay**
  The length of time between the softness minimum and the continuously-maintained tone quality. (The period of increase of the cut-off level.)
- **Sustain**
  The tone quality which is maintained continuously while the key is depressed.
- **Release**
  The length of time during which the tone quality becomes bright after the key is released.

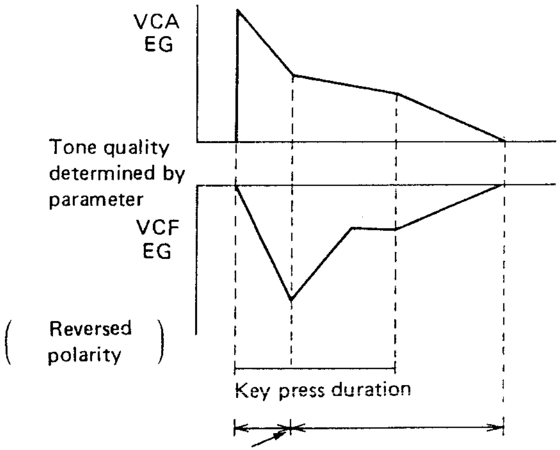
The reverse-phase envelope is most effective in the creation of sound effects.
As it is shown by Fig. 20, the cut-off level should be set relatively higher when the reverse-phase envelope is used, or the sound may not be produced.

Special Voices Using two EGs

- Piano Strings
  After the initial piano attack, the sound changes to resemble the continuous Sound Track voice.


VCA EG
VCF EG
Tone quality determined by parameter
Key press duration
Sound Track

- Planet
  When a key is pressed, the note is heard and then immediately fades out; if the key is still pressed, after a silent pause, the sound fades back in, almost like an echo.


VCA EG
Tone quality determined by parameter
VCF EG
Reversed polarity
Key press duration

Immediately before and after this, the level of the note is too low to hear.

Other than the special sounds above, there are many voices whose volume and tone envelopes are quite similar; among these are Clavichord, Guitar, and Human Voice.

Other Blocks

There are two blocks which add effects to voices generated using the **DCO**, **VCA** and **VCF** blocks. They are the **LFO** and **EFFECT** blocks.
LFO: Used to apply vibrato, and tone modulation.
EFFECT: Used to apply stereo effect, ensemble, and other effects.

■ LFO

The Low-Frequency Oscillator provides cyclic sound undulation, which can be applied to both the **DCO** and the **VCF**.

- **LFO** applied to **DCO** (for pitch modulation)
  The pitch can be varied, using a frequency determined by the **LFO**, to produce vibrato. this effect is most useful when applied to voices such as violin and human voice. The degree of the effect is controlled by the **VIBRATO** control in the **DCO** block. (Set to "0" when the effect is not used.)
- **LFO** applied to **VCF** for tone quality modulation)
  The tone quality (determined by the cut-off level) varies with the frequency determined by **LFO**, between bright and soft sounds. The soft undulation of luna flute and the undulating reverberation of vibraphoné are obtained by applying the **LFO** effect to **VCF** (tone quality).
  The degree of the effect is controlled by the **MODULATION** control in the **VCF** block. (Set to "0" when the effect is not used.)
- FREQUENCY
  Determines the frequency rate of undulation obtained with the VIBRATO or MODULATION control. The undulation speed becomes slower when the setting is low and faster as it is raised.
- DELAY
  Determines the length of time until the **LFO** effect is applied after the key is pressed. For instance, with the violin voice, vibrato is applied only a while after the sound is generated by pressing a key. This length can be varied using the DELAY control.
  When the control is set to "0", the effect is applied at the instant the sound is generated. The more the DELAY value, the longer the wait before vibrato is applied.

■ EFFECTS

Six kinds of effect are provided for professional sound enhancement.

- **Stereo Effect**
  Sounds are stereophonically expanded and given a deeper, more rich texture.
- **Reverb**
  Related to echo, this effect causes sounds to linger slightly after they would have normally ceased.
- **High-Pass Filter**
  While blocking low frequencies, this component allows high-frequency signals to pass through. Used to give more realism to light voices such as Piano.
- **Ensemble 1**
  As the name suggests, this effect expands one sound into a group of sounds.
- **Ensemble 2**
  Related to Ensemble 1, this version has the mid and low frequencies filtered out for a much lighter effect, especially useful with Strings.
- **Phaser**
  A whooshing, undulating effect.

The NS-70 is provided with 8 combinations of these 6 effects and the degree to which each effect is applied has been preset in 8 combinations. When an effect is to be used, it is necessary to select one of the 8 combinations shown below.

	Stereo Effect	Reverb	Other Effects
0	OFF	OFF	OFF
1	Medium	Small	OFF
2	Large	Medium	OFF
3	Large	Large	OFF
4	Small	Small	High-pass filter
5	(Included in Ensemble)	Large	Ensemble 1
6	(Included in Ensemble)	Large	Ensemble 2
7	Medium	Small	Phaser

PARAMETER LIST

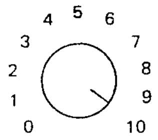
The elements which comprise a voice are called "parameters". The condition of the parameter (how much of the effect is applied) is represented by its "value".
(On the NS-70, parameters are selected using the CUSTOM COMBINATION MEMORY switches. Only numbers from 1 to 8 are used.)

Block	Parameter		Value			Description
	No.	Name	Small	Large	Contents	
DCO1	11	Octave	1	3	1=Low (16), 2=Mid (8′), 3=High (4′)	● Determines the octave of the 1st sound source (DC)1). Three octaves are selectable: 16′, 8′ or 4′.
	12	Square wave	0	1	0=OFF, 1=ON	● Determines the status of the square wave.
	13	Sawtooth wave	0	1	0=OFF, 1=ON	● Determines the status of the sawtooth wave.
DCO2	14	Octave	1	3	1=Low (16′), 2=Mid (8′), 3=High (4′)	● Determines the octave of the 2nd sound source (DCO2). Three octaves are selectable: 16′, 8′ or 4.
	15	Square wave	0	1	0=OFF, 1=ON	● Determines the status of the square wave.
	16	Detune	0	4	0=OFF, 1=Small to 4=Large	● Shifts the DCO2 pitches slightly with respect to the DCO1 pitches to create a thicker sounding, undulating voice. Ideal for use with accordion, etc.
	17	Interval	1	12	0=DCO1 same as DCO2 12=DCO2 one octave higher than DCO1.	● Shifts the DCO2 pitches by half steps. Produces the organ registration that creates fifth-note sound or "fat fifth" interval (Fifth Brass). When the 4′ octave is selected and the interval is set to "12",a 2′ octave can be obtained. * DCO2 level is lower than DCO1 level.
DCO	18	Pulse width	0	7	0=Wider pulse width 7=Narrower width	● Varies width of square wave.
	21	Vibrato	0	31	0=OFF, 1=Small to 15=Large	● Adjusts the degree of vibrato. * Vibrato affects only the SOLO and UPPER sections.
NOISE GENERATOR	22	VCF mode	1	2	1=VCF IN, 2=VCF OUT	● When using VCF OUT, only noise can bypass the VCF. Set to VCF OUT when noise is used to enhance a soft sound such as Jazz Flute. * Sections other than SOLO have only VCF IN functions (VCF OUT functions are not provided).
	23	Level	0	31	0=OFF, 1=Small to 31=Large	● Adjusts the noise level.
VCA EG	24	Attack	0	31	0=Fast to 31=Slow	● Determines the response speed of the voice.
	25	1st decay	0	31	0=Fast to 31=Slow	● Determines the volume decay time till the break point.
	26	Break point	0	31	0=Small to 31=Large	● Determines the lowest volume level after 1st decay.
	27	2nd decay	0	31	0=Fast to 31=Slow	● Determines the time till the sound goes off after break point. The maximum setting "31" produces continuous sound.
	28	Release	0	31	0 = Fast to 31=Slow	● Determines the abruptness with which the sound ceases after key release.
	31	Special percussive mode	0	1	0=OFF, 1=1st decay keep, 2nd decay & release keyboard follow	● When "1" (ON) is selected, percussive voices, such as piano, will be produced more naturally.
VCF	32	Cut-off	0	99	0=Low to 99=High	● Determines the tone brightness level.
	33	Resonance	0	15	0=Low to 15=High	● Determines the strength of the highest, brightest tones.
	34	Keyboard track	0	3	0=OFF, 1=1/4, 2=1/2, 3=Full	● Varies the tone strength between lower and higher octaves. The more the value is raised, the stronger will be the higher-octave notes: at "3" (= FULL) the high-pitch notes will sound as strong as the lower notes.
VCF EG	35	Polarity	1	2	1=In-phase, 2=Reversed phase,	● When "2" is selected, the envelope shape generated by the EG is reversed.
	36	EG level	0	31	0=OFF, 1=Small to 31=Large	● Adjusts the EG envelope size.
	37	Attack	0	31	0=Fast to 31=Slow	● Determines the peak brightness of the tone.
	38	Decay	0	31	0=Fast to 31=Slow	● Determines the time till the tone brightness drops to the level determined by SUSTAIN.
	41	Sustain	0	31	0=Small to 31=Large	● Determines the level at which tone brightness is continuously maintained while the key is pressed.
	42	Release	0	31	0=Fast to 31=Slow	● Determines how long the tone will linger after the key is released.
VCF	43	Modulation level	0	15	0=OFF, 1=Small to 15=Large	● Determines the degree to which the LFO ("46") will cause the tone to undulate.

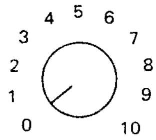
<table>
<tr><th rowspan="2">Block</th><th colspan="2">Parameter</th><th colspan="3">Value</th><th rowspan="2">Description</th></tr>
<tr><th>No.</th><th>Name</th><th>Small</th><th>Large</th><th>Contents</th></tr>
<tr><td>Voice</td><td>44</td><td>Level</td><td>0</td><td>31</td><td>0=OFF, 1=Small to 31=Large</td><td>• Some synthesizer voices are louder than others, just as a violin, for example, is louder than a flute. This is partially the result of different cut-off levels, and should be taken into consideration when playing; you may want to increase or decrease certain cut-off levels to minimize such discrepancies.</td></tr>
<tr><td>Effect</td><td>45</td><td>Effect</td><td>0</td><td>7</td><td><table>
<tr><th></th><th>Stereo effect</th><th>Reverb</th><th>Other effects</th></tr>
<tr><td>0</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>1</td><td>Mid</td><td>S</td><td>OFF</td></tr>
<tr><td>2</td><td>L</td><td>Mid</td><td>OFF</td></tr>
<tr><td>3</td><td>L</td><td>L</td><td>OFF</td></tr>
<tr><td>4</td><td>S</td><td>S</td><td>HPF</td></tr>
<tr><td>5</td><td rowspan="2">(incl. Ens.)</td><td>L</td><td>Ens. 1</td></tr>
<tr><td>6</td><td>L</td><td>Ens. 2</td></tr>
<tr><td>7</td><td>Mid</td><td>S</td><td>Phaser</td></tr>
</table></td><td>• 8 effects are provided by combining various factors. Effect No. 4, high-pass filter, is used for percussive voices such as piano. Since the piano sound has a low cut-off and brake-pointe level, the volume level is lower than other voices. To compensate for this, Effect No. 4 is added to piano to increase the volume and reduce the difference between instruments. Be careful when this effect is used with continuous sounds, as it may cause distortion by overly increasing the volume level.</td></tr>
<tr><td rowspan="2">LFO</td><td>46</td><td>Frequency</td><td>1</td><td>16</td><td>1=Slow, to 16=Fast</td><td>• Determines the vibrato undulation rate and controls VCF modulation.</td></tr>
<tr><td>47</td><td>Delay</td><td>0</td><td>7</td><td>0=OFF, 1=Fast to 3=Large</td><td>• Determines the time it takes after a key is pressed until the modulation or vibrato is applied.
* LFO delay affects only the SOLO and UPPER sections.</td></tr>
<tr><td rowspan="2">Touch Sensitivity</td><td>48</td><td>VCA intensity</td><td>0</td><td>3</td><td>0=OFF, 1=Small to 3=Large</td><td>• The sound volume is varied depending on how hard the key is pressed, making more detailed musical expression possible. Raising the value results in a greater difference between light and heavy touches of the keys.</td></tr>
<tr><td>51</td><td>VCF intensity</td><td>0</td><td>2</td><td>0=OFF, 1=Small, 2=Large</td><td>• The tone can also be varied depending on how hard the keys are pressed. Heavily pressing down on the keys will produce a sharp, bright sound, whereas when the key is pressed gently a soft, slightly muffled tone is produced. This provides an effective means of creating a more realistic brass voice, for example.
* The touch function does not affect the BASS and ACCOMP sections.</td></tr>
</table>

Parameters

Think of the volume control on a stereo. When this control is turned completely clockwise, the sound is as loud as the machine will put out, and the notch is pointing at "10". Turn it back completely counterclockwise, to "0", and no sound is produced. In this case, the increments from "0" to "10" represent the parameters of volume.

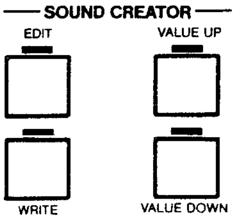


Maximum Volume



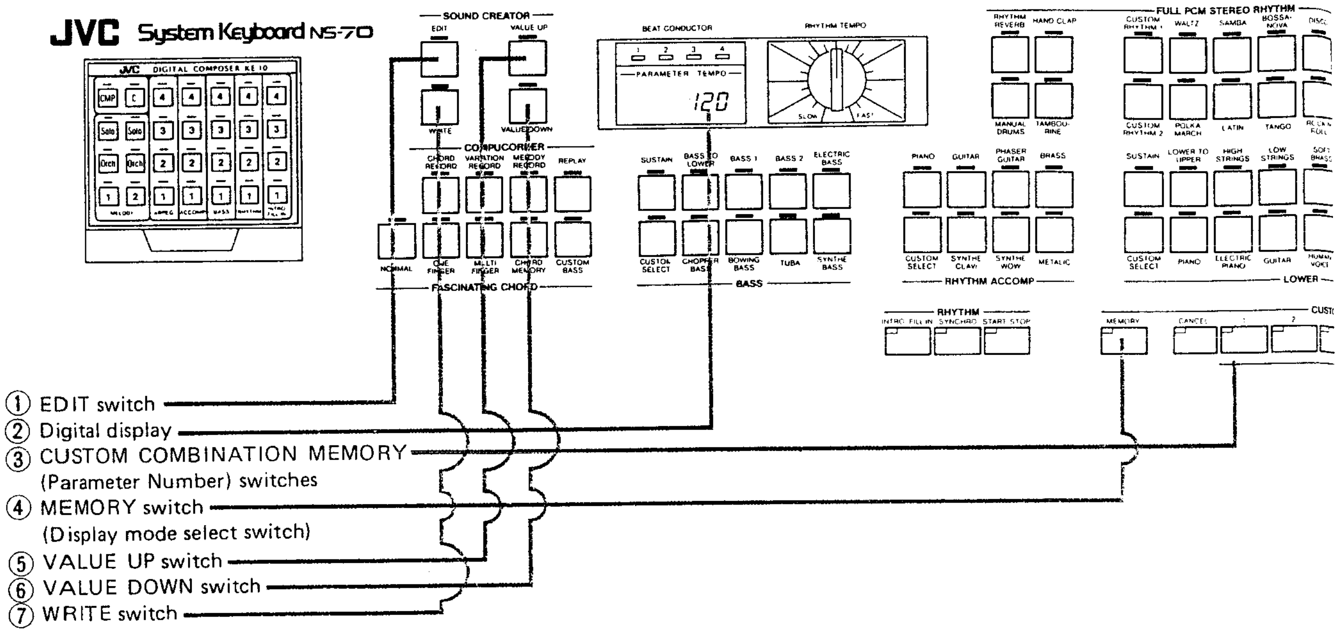
No volume.

On the NS-70, instead of twisting a knob, you change parameter values using the value up/down switches.



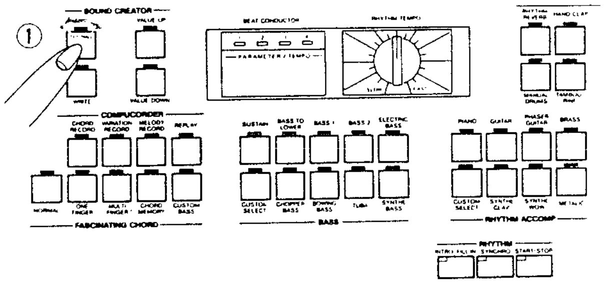
EDITING (SOUND MAKING)

With the NS-70, PRESET or CUSTOM voices can be modified and new voices created by increasing or decreasing the value of parameters that comprise each sound.

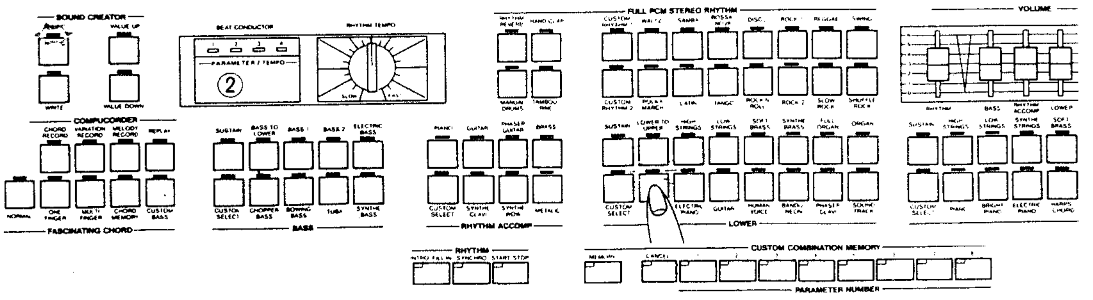

JVC System Keyboard NS-70
DIGITAL COMPOSER KE 10
SOUND CREATOR
EDIT
VALUE UP
WRITE
VALUE DOWN
COMPUCORDER
FASCINATING CHORD
BASS
RHYTHM ACCOMP
FULL PCM STEREO RHYTHM
LOWER
RHYTHM
MEMORY
CANCEL
① EDIT switch
② Digital display
③ CUSTOM COMBINATION MEMORY (Parameter Number) switches
④ MEMORY switch (Display mode select switch)
⑤ VALUE UP switch
⑥ VALUE DOWN switch
⑦ WRITE switch

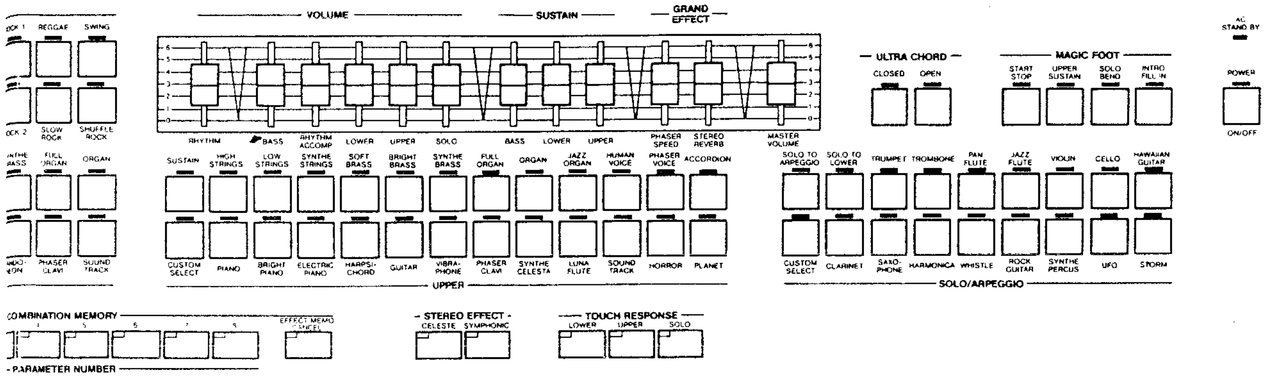
Editing Procedure

1 Press EDIT switch ①; its LED lights.

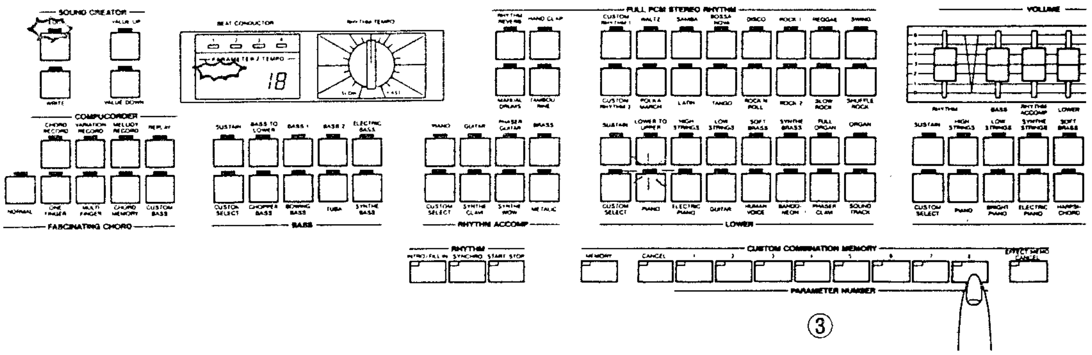


2. Press the switch of the voice to be edited; its LED blinks. At the same time, Display ② goes off.

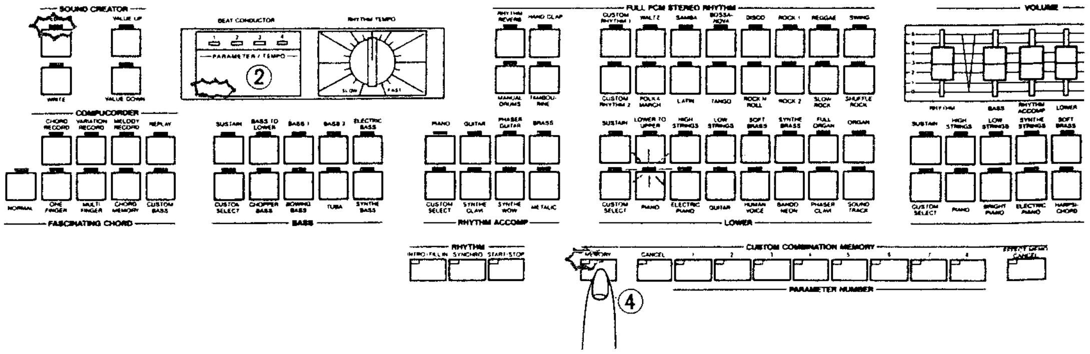

②
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER


VOLUME
SUSTAIN
GRAND EFFECT
ULTRA CHORD
CLOSED
OPEN
MAGIC FOOT
START STOP
UPPER SUSTAIN
SOLO BEND
INTRO FILL IN
AC STAND BY
POWER
ON/OFF
RHYTHM
BASS
RHYTHM ACCOMP
LOWER
UPPER
SOLO
PHASER SPEED
STEREO REVERB
MASTER VOLUME
UPPER
SOLO/ARPEGGIO
COMBINATION MEMORY
EFFECT MEMO CANCEL
PARAMETER NUMBER
STEREO EFFECT
CELESTE
SYMPHONIC
TOUCH RESPONSE
LOWER
UPPER
SOLO

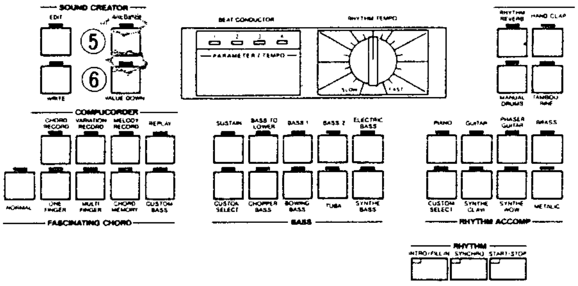
3. Input the desired parameter by selecting the parameter to be used from the Parameter List and press the switches of the number selected from among CUSTOM COMBINATION MEMORY (Parameter Number) switches 1 to 8 ③. The Parameter Number mode LED (NUMBER) lights.


SOUND CREATOR
BEAT CONDUCTOR
PARAMETER / TEMPO
18
FULL PCM STEREO RHYTHM
VOLUME
COMPUCORDER
FASCINATING CHORD
BASS
RHYTHM ACCOMP
LOWER
RHYTHM
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER
③

4. To check the present value of the selected parameter, press MEMORY switch ④.
Display ② changes from the parameter number display mode to the parameter value display mode, and the Parameter Value Mode LED (VALUE) lights.


SOUND CREATOR
BEAT CONDUCTOR
PARAMETER / TEMPO
②
FULL PCM STEREO RHYTHM
VOLUME
COMPUCORDER
FASCINATING CHORD
BASS
RHYTHM ACCOMP
LOWER
RHYTHM
MEMORY
CANCEL
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER
④

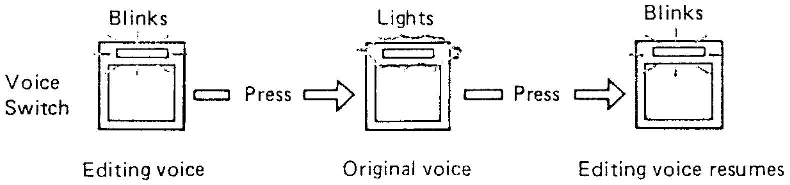
5. While pressing a key and listening to the sound produced, vary the value by pressing VALUE UP/DOWN switches (5) (6) until the desired sound is obtained.
   When procedure 4. is omitted, Display ② can be returned from the parameter number display mode to the parameter value display mode by pressing either of UP/DOWN switches ⑤ ⑥ once.



6. To input another parameter after a value has been set, press one of COMBINATION MEMORY switches 1 to 8.

7. To check a parameter number while setting a value, press MEMORY switch ④ to change display ② from the parameter value display mode to the number display mode. Pressing the MEMORY switch again retrieves the value display mode.

- **To recall the original voice**
  During editing, the original voice (sound before editing) can be recalled by pressing the switch of the voice being edited so that the blinking LED lights. When this voice switch is pressed again, the editing condition will be resumed.
  N.B. During the editing process, the voice being edited is the only one in its section (UPPER, LOWER, BASS, etc.) whose LED is blinking and is the only voice that will be heard. Pressing other switches in the same section will not activate their voices.

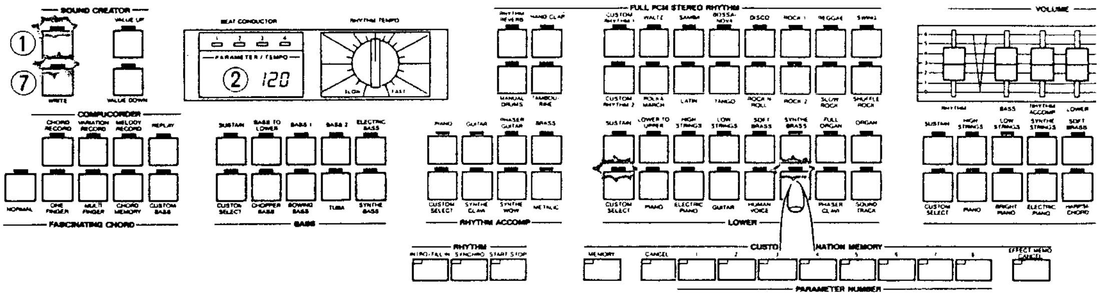


Writing of Edited Data

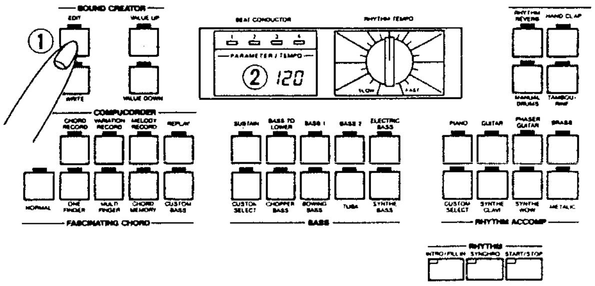
The memory of a CUSTOM VOICE can be cleared and an edited (newly created) voice stored in its place.

1. Select the voice to be replaced.

2. While pressing WRITE switch ⑦, press the switch of the voice to be stored. The selected voice LED lights and the newly created voice is now stored there. EDIT LED ① goes off and Display ② resumes the tempo display mode.



- To finish editing without storing the voice
  Press EDIT switch ① so that the LED goes off. The Display ② returns to the tempo display mode, the condition before editing is resumed, and the voice being edited is cleared.



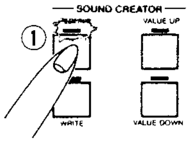
- Effective parameters of each section
  There are parameters which are effective only in one of the sections; SOLO, UPPER, LOWER, ACCOMP or BASS. In some cases, the same tone may not be obtained when a voice is transferred from one section to another.

- Combination Memory Mode Status after Voice Creation
  When entering into the Edit mode from the Combination Memory mode with edited data stored in one of the Custom Voices, the EDIT LED goes off and the COMBINATION MEMORY switch LEDs showing the condition before editing light. At this time, the voice switch LEDs of the previous assignment are not lit but the data-stored switch LED is. (This will tell you whether or not the switch has stored the data.)
  However, when the conditions on the control panel are not stored in the Combination Memory and the COMBINATION MEMORY switch is pressed again, the setting condition before sound creating will be recalled.
  When entering into the edit mode from the cancel mode, the same phenomenon will occur.

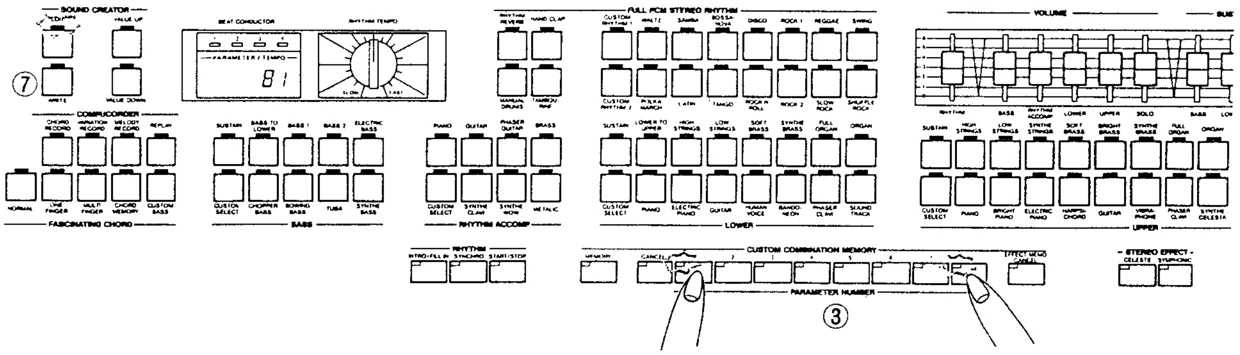
Recalling an Internal Custom Voice

Even after storing a newly created voice in place of an internal CUSTOM VOICE, the latter can be retrieved. (This will completely erase the newly-created voice, however; to use that voice again, it must be re-created using the editing procedure.)

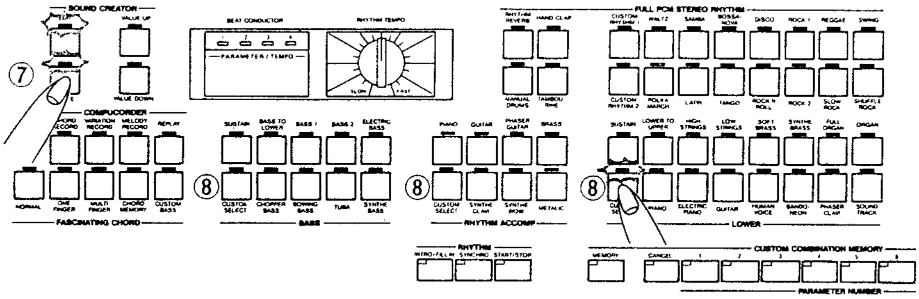
1. Press EDIT switch ①.


SOUND CREATOR
VALUE UP
①
WRITE
VALUE DOWN

2. Input "81" using number switches ③.


SOUND CREATOR
⑦
COMPUCORDER
FASCINATING CHORD
BASS
RHYTHM ACCOMP
FULL PCM STEREO RHYTHM
VOLUME
LOWER
UPPER
RHYTHM
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER
STEREO EFFECT
8 1
③

3. While pressing WRITE switch ⑦, press CUSTOM VOICE switch ⑧ in the section of the voice to be recalled. The blinking CUSTOM VOICE switch LED lights and all Custom Voices in the section are recalled.


SOUND CREATOR
⑦
COMPUCORDER
FASCINATING CHORD
⑧
BASS
⑧
RHYTHM ACCOMP
⑧
LOWER
FULL PCM STEREO RHYTHM
RHYTHM
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER

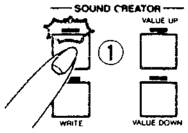
4. When finished, press the EDIT switch ① so that the EDIT LED goes off.

The NS-70's power must be switched "on" once every two weeks, to prevert loss of custom voice data. Data may also be safely stored using an optional Digital Memory Pack (NS-M10).

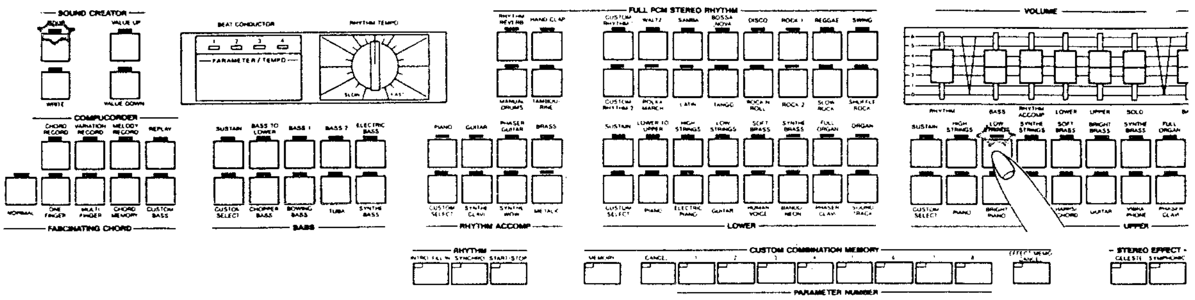
Modification Procedure: An Example

To make the attack (the speed with which a sound reaches its peak volume and/or highest tone when a key is pressed) of the LOW STRINGS on the UPPER section faster:

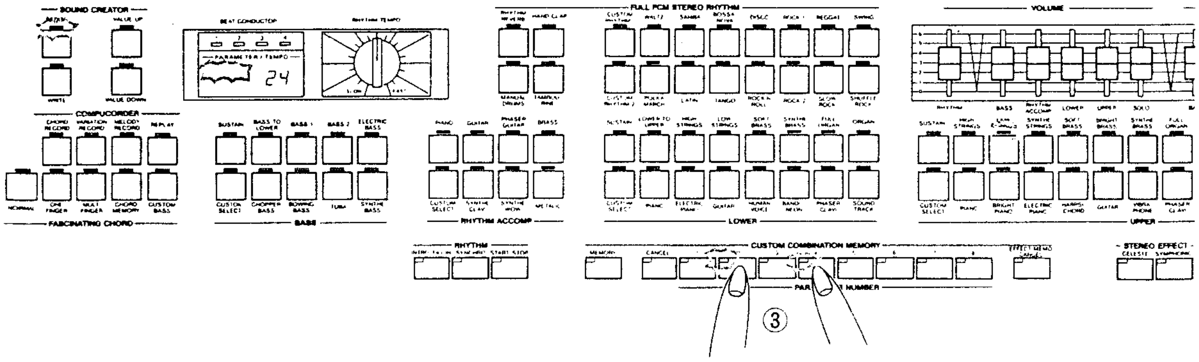
1. Press EDIT switch ①.


SOUND CREATOR
VALUE UP
①
WRITE
VALUE DOWN

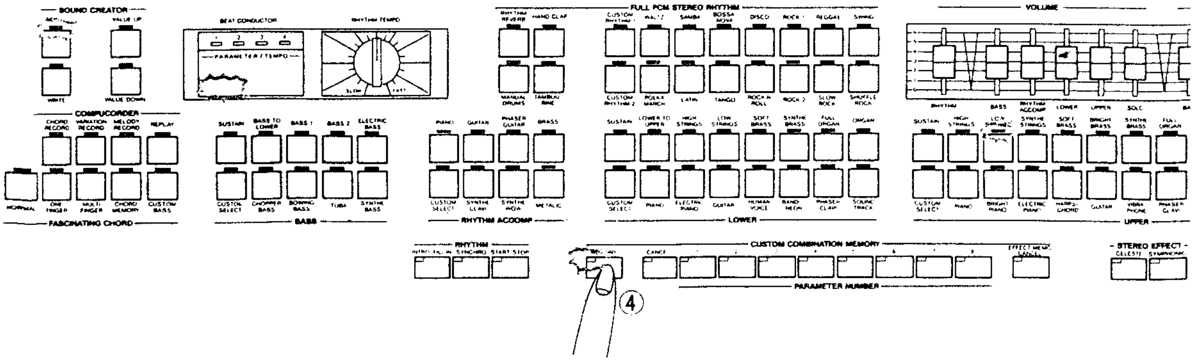
2. Press the LOW STRINGS switch in the UPPER section.


SOUND CREATOR
BEAT CONDUCTOR
RHYTHM TEMPO
FULL PCM STEREO RHYTHM
VOLUME
COMPUCORDER
FASCINATING CHORD
BASS
RHYTHM ACCOMP
LOWER
UPPER
RHYTHM
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER
STEREO EFFECT

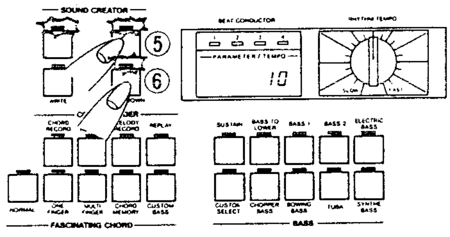
3. Search for ATTACK on the Parameter List. (Actually, there are two: VCA ATTACK, which controls the rise of sound to peak volume, number "24", and VCF ATTACK, which controls the rate of change from low (bass) tone to high (treble) tone, number "37".)
4. Input VCA ATTACK, number "24", using COMBINATION MEMORY switches ③.


24
③
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER

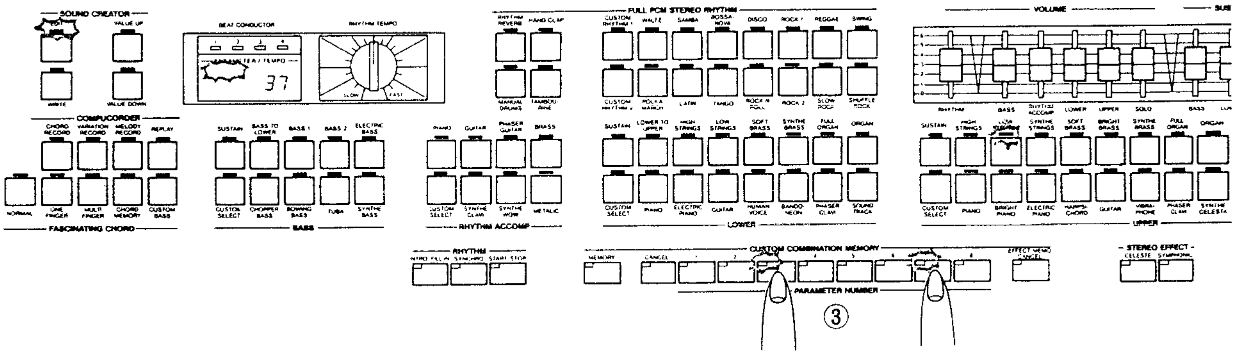
5. Press MEMORY switch ④ to change the display from the parameter display mode to the value display mode.


④
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER

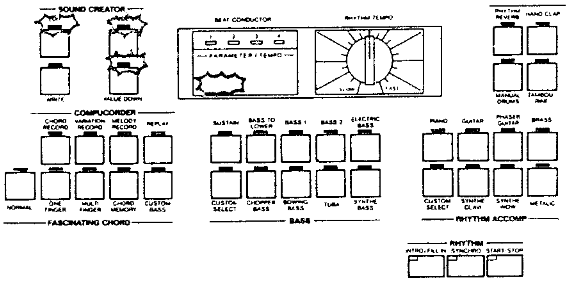
6. While listening to the sound by pressing a key, lower the value to the desired level with VALUE DOWN switch ⑥. (If lowered too much, the value can be raised using VALUE UP switch ⑤.)


SOUND CREATOR
⑤
⑥
BEAT CONDUCTOR
RHYTHM TEMPO
PARAMETER / TEMPO
10
FASCINATING CHORD
BASS

7. Input VCF ATTACK, number "37", using COMBINATION MEMORY switches ③.


SOUND CREATOR
VALUE UP
VALUE DOWN
BEAT CONDUCTOR
RHYTHM TEMPO
37
COMPUCORDER
FASCINATING CHORD
BASS
RHYTHM ACCOMP
FULL PCM STEREO RHYTHM
LOWER
VOLUME
UPPER
RHYTHM
CUSTOM COMBINATION MEMORY
PARAMETER NUMBER
STEREO EFFECT
③

8. Adjust the value with the VALUE UP/DOWN switches while listening to the sound. (See 6)


SOUND CREATOR
BEAT CONDUCTOR
RHYTHM TEMPO
PARAMETER / TEMPO
COMPUCORDER
FASCINATING CHORD
BASS
RHYTHM ACCOMP
RHYTHM

A voice modified in this way can be stored using one of the CUSTOM VOICE switches. Newly-modified voices can be recalled and used in the same way as other voices, even while playing. (See "Writing of Edited Data" on page 13.)

HINTS FOR SOUND MAKING

Up to this point we have described the various methods of sound creation and modification; some concrete examples of the same – including the parameter to be changed – are described as follows.

	Required sound	Parameter	Value
Tone Color	Stronger, brighter sound	32. Cut-off	Increase
	Softer sound	32. Cut-off	Decrease
	Thinner, "bizarre" sound	33. Resonance 18. Pulsewidth (when square wave is used)	Increase Increase
	Thicker, straight-forward sound	33. Resonance 18. Pulsewidth (when square wave is used)	Decrease Decrease
Tone Generation	Quicker attack	24. VCA Attack 37. VCF Attack	Decrease Decrease
	Slower attack	24. VCA Attack 37. VCF Attack	Increase Increase
	Longer lingering after keys are released	28. VCA Release 42. VCF Release	Increase Increase
	Shorter lingering after keys are released	28. VCA Release 42. VCF Release	Decrease Decrease

The following are examples of voices made using the waveforms generated by the DCO.

Waveform	Example of Voices
Sawtooth wave (⩘)	Strings, Brass, Piano, etc.
Square wave Pulse width 0 (⎍) Wide	Clarinet, Vibraphone, Guitar
(⎍)	Saxophone, Human Voice, Oboe, Accordion
7 (⎍) Narrow	Harpsichord, Clavichord

TROUBLESHOOTING DURING SOUND MAKING

Trouble	Parameters to be checked	Check if . . .	Remedy
No sound	44. Voice Level	If it is "0"	Increase.
	12. DC01 Square 13. DC01 Saw 15. DC02 Square	If they are "OFF"	Set to "ON".
	32. Cut-off	If it is too small	Increase.
	35. VCF Polarity 36. VCF EG level	If EG level is too High with reversed polarity	Decrease EG.
	24. VCA Attack 37. VCF Attack	If they are too large	Decrease.
Sound too quiet	44. Voice Level	If it is too low	Increase.
	32. Cut-off	If it is too low	Increase.
Static noise	31. Noise Level	If it is too high	Set to "0".
Sound vanishes while keys are depressed	26. VCA Break point	If it is too low	Increase.
	27. VCA 2nd Decay	If it is "0"	Increase.
	35. VCF Polarity	If it is reversed	Return to normal.
Notes do not coincide with keys	17. DC02 Interval	If it is set to other than "0"	Set to "0".

*Since the BASS voice is set at lower frequency and higher volume than other sections, the osound may be loose or distorted when the Effect 3, 5, 6 or 7 is used.

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